WBS Dictionary as of Wed 6/1/05
Run IIb Installation

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5	**Run IIb Installation**	Mon 1/5/04	Tue 3/28/06	$175,000.00	$0.00	$501,732.78	$676,732.78

Notes

WBS Definition-
This summary task has as its scope the removal of the Run IIa silicon Hdisks and the installation of a new L0 tracker, and the installation of the L1 Calorimeter tracking trigger, the L1 Calorimeter track matching system, upgrades to the Level 2 beta processors, the L2 silicon track trigger upgrade, and the technical commissioning of all the new systems before and after the closing of the detector and the physics commissioning of the upgrades during the restart of the colliding beam program.

1.5.1	**2004 Tevatron Shutdown Begins**	Mon 8/23/04	Mon 8/23/04	$0.00	$0.00	$0.00	$0.00

Notes

WBS Definition-
Milestone-Beginning of Fall 2004 Tevatron Shutdown

1.5.2	**L0 Silicon Ready to Move to DAB**	Fri 9/9/05	Fri 9/9/05	$0.00	$0.00	$0.00	$0.00
1.5.3	**L0 Installation Tooling Complete**	Mon 10/3/05	Mon 10/3/05	$0.00	$0.00	$0.00	$0.00

Notes

WBS Definition-
Milestone- L0 packed and ready to be shipped to DAB

1.5.4	**Latest RunIIb Hardware Production & Testing Completion**	Fri 9/9/05	Fri 9/9/05	$0.00	$0.00	$0.00	$0.00

Notes

WBS Definition-
Milestone-Milestone: date of completion of latest RunIIb Hardware Production and Testing (L1 CTT)

1.5.5	**2005 Tevatron Shutdown Begins**	Mon 10/3/05	Mon 10/3/05	$0.00	$0.00	$0.00	$0.00

Notes

WBS Definition-
Milestone-Earliest desired date of Tevatron shutdown.

1.5.6	**Layer 0 Silicon Installation & Technical Commissioning**	Mon 1/5/04	Thu 1/12/06	$29,500.00	$0.00	$123,775.18	$153,275.18

Notes

WBS Definition-
This summary task covers the effort to install the L0 silicon tracker for the D0 Run IIb upgrade project. The detector will augment the existing silicon microstrip tracker currently in use for Run IIa, and it assumes the use of the Vicor LV supplies and special adapter cards plus SVX4 readouts for the L0 channels, and it assumes the use of 80-conductor cables for the 300V HV supply.

1.5.6.1	**Prepare Silicon Infrastructure**	Mon 1/5/04	Thu 8/18/05	$29,500.00	$0.00	$42,472.46	$71,972.46

Notes

WBS Definition-
This summary task includes activities that must take place to ensure that all infrastructure components required for the Run II b silicon (cables, adapter cards, chiller and dry gas systems, transportation and alignment fixtures, temperature monitoring system and HV and LV systems) are in hand prior to shutdown.

1.5.6.1.1	Prepare L0 Adapter Cards and Mounting	Mon 1/5/04	Mon 12/13/04	$15,000.00	$0.00	$1,518.56	$16,518.56

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	10%	$0.00	$0.00	$0.00	$0.00	192 h	0 h	0 h	192 h	0 h
12	PhysicistU	5%	$0.00	$0.00	$0.00	$0.00	96 h	0 h	0 h	96 h	0 h
15	DesignerF	4%	$2,661.12	$0.00	$2,661.12	$0.00	76.8 h	0 h	0 h	76.8 h	0 h
37	SeniorElecEngF	5%	$754.40	$0.00	$754.40	$0.00	16 h	0 h	0 h	16 h	0 h
40	SeniorMechTechF	2%	$1,103.04	$0.00	$1,103.04	$0.00	38.4 h	0 h	0 h	38.4 h	0 h
48	MandS	12,000	$12,000.00	$0.00	$12,000.00	$0.00	12,000		0	12,000	0
55	Linda Bagby	5%	$0.00	$0.00	$0.00	$0.00	96 h	0 h	0 h	96 h	0 h
65	Ron Sidwell	5%	$0.00	$0.00	$0.00	$0.00	96 h	0 h	0 h	96 h	0 h
66	Andre Numerotski	5%	$0.00	$0.00	$0.00	$0.00	96 h	0 h	0 h	96 h	0 h
70	Mike Matulik	5%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	16 h	0 h

Notes

WBS Definition-
This task provides for the design, plus considerations for mounting and cooling, of the L0 adapter cards required for the SVX4 silicon readout. The adapter cards will be mounted on the existing horseshoes on the N and S faces of the Central Calorimeter in the RunIIa H-disk locations, and powered by new Wiener LV supplies.
Attention to cooling is required and measurements of power loads at the adapter cards will be made to quantify the heat load created at the horseshoes.
Included in the design task are considerations of cable routing (re-use of the 80-conductor cables of the H-disks) and considerations of the radiation monitor boards and cables, and L0 temperature monitor boards and cables that must be added to the existing horseshoes on the N and S faces of the Central Calorimeter.
[As of 1/05, adapter card location, standoff design, cooling (none needed), are finished. Only a small transition card for temp mon cables at horseshoe remain to be completed).

M&S BOE-
Adding cooling for new adapter cards may require a small amount of parts fabrication for active air-flow or passive conductive cooling for the new adapter cards. Until heat load (<100 W ?) is established, the choice of technology is not known. Contingency on this estimate is therefore set at 100%.

Labor BOE-
1/2 man-month of designer (i.e. Jack Mateski), and 2 man-months of physicst time are required to complete this task, but contingency is put at 100% until the details of the task are better understood. Some combination of Ron Sidwell, Andre Numerotski, and Lyn Bagby are the preferred physicists.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.6.1.2	Prepare New L0 HV Power Supply Systems	Tue 10/26/04	Mon 3/21/05	$5,000.00	$0.00	$7,544.00	$12,544.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	25%	$0.00	$0.00	$0.00	$0.00	160 h	0 h	0 h	72 h	88 h
37	SeniorElecEngF	25%	$7,544.00	$0.00	$3,394.80	$4,149.20	160 h	0 h	0 h	72 h	88 h
48	MandS	5,000	$5,000.00	$0.00	$5,000.00	$0.00	5,000		0	4,500	500
55	Linda Bagby	25%	$0.00	$0.00	$0.00	$0.00	160 h	0 h	0 h	72 h	88 h
72	John Anderson	25%	$0.00	$0.00	$0.00	$0.00	160 h	0 h	0 h	72 h	88 h

Notes

WBS Definition-
This task provides for the development of the high voltage fanouts for the L0 channels -- additional fanouts may be necessary in MCH2 if those released by the removal of the H-disks are inappropriate.
[1/05 the HV crates, mother boards, pods, and crate PS, are in hand. The pods are tested, the crate PS is ready to test, the MCH2 rack layout is done, the fanouts are done. The 96 SHV cables for MCH (pod -- fanout) must be purchased, and the gauge-change panels made -- these panels must be installed during the 2005 shutdown].

M&S BOE-
Added HV channels may be required in MCH2, but no additional 50-conductor (MCH -- Platform) nor 34-conductor cables are required. 96 SHV cables are required for MCH2.

Labor BOE-
Two man-months of physicst time and the like for Electrical Engineer are required to complete this task. Lynn Bagby and John Foglesong are the preferred personnel

1.5.6.1.3	Refurbish dry gas system	Thu 6/23/05	Thu 8/18/05	$500.00	$0.00	$14,482.40	$14,982.40

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	25%	$0.00	$0.00	$0.00	$0.00	80 h	0 h	0 h	0 h	80 h
37	SeniorElecEngF	25%	$3,772.00	$0.00	$0.00	$3,772.00	80 h	0 h	0 h	0 h	80 h
39	SeniorMechEngF	10%	$1,518.40	$0.00	$0.00	$1,518.40	32 h	0 h	0 h	0 h	32 h
40	SeniorMechTechF	100%	$9,192.00	$0.00	$0.00	$9,192.00	320 h	0 h	0 h	0 h	320 h
48	MandS	500	$500.00	$0.00	$0.00	$500.00	500		0	0	500
58	Bill Cooper	25%	$0.00	$0.00	$0.00	$0.00	80 h	0 h	0 h	0 h	80 h
59	Russ Rucinski	10%	$0.00	$0.00	$0.00	$0.00	32 h	0 h	0 h	0 h	32 h
76	Tom Regan	25%	$0.00	$0.00	$0.00	$0.00	80 h	0 h	0 h	0 h	80 h

Notes

WBS Definition-
This task provides for required refurbishment of the existing dry air system for the silicon, including overhaul of the (dual) compressors, refurbishment of the driers, and any other needed preventive maintenance (e.g. tube trailer recertification) . Because the components are dual, the refurbishment takes place prior to the shutdown for RunIIb during normal physics operation of the Tevatron.

M&S BOE-
A small amount of hardware (electrical, valves, etc.) may be required for the refurbishment, $500 Contingency is set at 100% given the lack of detail available for this system.

Labor BOE-
The estimated labor requirements are based on RunIIA experience with the dry air system. One full time mechanical technician, plus 2w of a mechanical engineer, 2 weeks of an electrical engineer, and 2w of a physicist to guide the task, are required. Contingency is set at 150%. Dan Markley is the preferred electrical engineer, Bill Cooper the preferred physicist, and Russ Rucinski the preferred mechanical engineer.

1.5.6.1.4	Interface L0 Temp Monitoring System to DMACS	Wed 5/25/05	Wed 6/8/05	$6,000.00	$0.00	$760.00	$6,760.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
13	CompProfF	25%	$760.00	$0.00	$0.00	$760.00	20 h	0 h	0 h	0 h	20 h
48	MandS	6,000	$6,000.00	$0.00	$0.00	$6,000.00	6,000		0	0	6,000
60	Dan Markely	25%	$0.00	$0.00	$0.00	$0.00	20 h	0 h	0 h	0 h	20 h

Notes

WBS Definition-
This task provides for the interfacing of the L0 Temp Mon system to the Cryo Computer Control system: procure AD modules, test modules, insert device names in tables, lay out operator's console screens.

M&S BOE-
NA

Labor BOE-
The estimated labor requirements are based on RunIIA experience, where hundreds of channels of temperature monitoring were interfaced to the DMACS system. Dan Markley is the preferred electrical engineer.

1.5.6.1.5	Label and Test TempMon Cables	Wed 5/11/05	Thu 5/12/05	$500.00	$0.00	$240.00	$740.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	10%	$0.00	$0.00	$0.00	$0.00	1.6 h	0 h	0 h	0 h	1.6 h
38	SeniorElecTechF	50%	$240.00	$0.00	$0.00	$240.00	8 h	0 h	0 h	0 h	8 h
48	MandS	500	$500.00	$0.00	$0.00	$500.00	500		0	0	500
55	Linda Bagby	10%	$0.00	$0.00	$0.00	$0.00	1.6 h	0 h	0 h	0 h	1.6 h

Notes

WBS Definition-
This task tests, labels and bundles the temperature monitoring cables for the L0 detector (DMarkley chassis in Platform to horseshoes). Summer 2004 shutdown provides adequate window for installation of cables.

M&S BOE-
$500 for cables

Labor BOE-
Testing, labeling, bundling effort: 16 (8 per end) 22-Ga temperature monitoring cables. Labeling & Testing: Glenair tester permits testing of 1 cable in 5--10 minutes. Labeling and bundling make the task a 2 day's job.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.6.1.6	Prepare New LV Power Supply System for L0	Thu 4/29/04	Fri 8/20/04	$0.00	$0.00	$1,508.80	$1,508.80

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	10%	$0.00	$0.00	$0.00	$0.00	64 h	0 h	0 h	64 h	0 h
37	SeniorElecEngF	5%	$1,508.80	$0.00	$1,508.80	$0.00	32 h	0 h	0 h	32 h	0 h
38	SeniorElecTechF	10%	$0.00	$0.00	$0.00	$0.00	0 h	0 h	0 h	0 h	0 h
55	Linda Bagby	10%	$0.00	$0.00	$0.00	$0.00	64 h	0 h	0 h	64 h	0 h
69	John Fogelsong	10%	$0.00	$0.00	$0.00	$0.00	64 h	0 h	0 h	64 h	0 h
72	John Anderson	5%	$0.00	$0.00	$0.00	$0.00	32 h	0 h	0 h	32 h	0 h

Notes

BS Definition-
One new Wiener LVPS unit (4 +1 modules) are required in MCH2, plus 10 cables to the Cathedral minifuse panels. In addition to design of cables and fuse panels, the task includes linking the system to the Silicon glycol system so a cooling trip also shuts down the Wiener PS.
At least 3 modules in a unit will be installed in the 2004 shutdown, plus the minifuse panels.
The trip system will be installed and tested in the 2004 shutdown.
[1/5 all done except CAN controller software prepared].

M&S BOE-
M&S ($2.5K) for conversion of 100% Teststand (Sidet) Wiener to D0 configuration is allotted.

Labor BOE-
One man-months of physicst time and the like for Electrical Engineer are required to complete this task. Lynn Bagby and John Foglesong are the preferred personnel.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.6.1.7	**Fall 2004 Shutdown Tasks**	**Mon 8/23/04**	**Mon 11/22/04**	**$2,500.00**	**$0.00**	**$5,042.70**	**$7,542.70**
1.5.6.1.7.1	L0 Clearance Measurement	Tue 10/5/04	Mon 10/25/04	$0.00	$0.00	$0.00	$0.00
1.5.6.1.7.2	L0 Prototype Modules Installed On Face of CC	Tue 10/19/04	Tue 10/19/04	$0.00	$0.00	$0.00	$0.00
1.5.6.1.7.3	Install New LV Power Supply System for L0	Mon 8/23/04	Fri 8/27/04	$2,500.00	$0.00	($2,290.80)	$209.20

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	10%	$0.00	$0.00	$0.00	$0.00	4 h	0 h	0 h	4 h	0 h
37	SeniorElecEngF	5%	$94.30	$0.00	$94.30	$0.00	2 h	0 h	0 h	2 h	0 h
40	SeniorMechTechF	10%	$114.90	$0.00	$114.90	$0.00	4 h	0 h	0 h	4 h	0 h
55	Linda Bagby	10%	$0.00	$0.00	$0.00	$0.00	4 h	0 h	0 h	4 h	0 h
69	John Fogelsong	10%	$0.00	$0.00	$0.00	$0.00	4 h	0 h	0 h	4 h	0 h
72	John Anderson	5%	$0.00	$0.00	$0.00	$0.00	2 h	0 h	0 h	2 h	0 h

Notes

WBS Definition-
One new Wiener LVPS unit (4 +1 modules) are required in MCH2, plus 10 cables to the Cathedral minifuse panels. In addition to design of cables and fuse panels, the task includes linking the system to the Silicon glycol system so a cooling trip also shuts down the Wiener PS.
At least 3 modules in a unit will be installed in the 2004 shutdown, plus the minifuse panels.
The trip system will be installed and tested in the 2004 shutdown.
[1/5 all done except CAN controller software prepared].

M&S BOE-
M&S ($2.5K) for conversion of 100% Teststand (Sidet) Wiener to D0 configuration is allotted.

Labor BOE-
One man-months of physicst time and the like for Electrical Engineer are required to complete this task. Lynn Bagby and John Foglesong are the preferred personnel.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.6.1.7.4	Test Isolated PS Interlock System for L0	Tue 11/16/04	Mon 11/22/04	$0.00	$0.00	$851.50	$851.50

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	10%	$0.00	$0.00	$0.00	$0.00	4 h	0 h	0 h	4 h	0 h
13	CompProfF	25%	$380.00	$0.00	$380.00	$0.00	10 h	0 h	0 h	10 h	0 h
37	SeniorElecEngF	25%	$471.50	$0.00	$471.50	$0.00	10 h	0 h	0 h	10 h	0 h
58	Bill Cooper	10%	$0.00	$0.00	$0.00	$0.00	4 h	0 h	0 h	4 h	0 h
60	Dan Markely	25%	$0.00	$0.00	$0.00	$0.00	10 h	0 h	0 h	10 h	0 h
69	John Fogelsong	25%	$0.00	$0.00	$0.00	$0.00	10 h	0 h	0 h	10 h	0 h

Notes

WBS Definition-
This task installs and tests the new L0 silicon LV system temperature interlock. It will be done in the 2004 shutdown. Safety/PORC review needed prior to test/operation.
[1/05: task done].

M&S BOE-
NA

Labor BOE-
Estimates are based on a considertion of the task. Dan Markley and John Foglesong, plus Bill Cooper, and an Operations Tech are required.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.6.1.7.5	Terminate L1 CTT/CTMcables	Mon 8/23/04	Mon 9/20/04	$0.00	$0.00	$4,596.00	$4,596.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
40	SeniorMechTechF	100%	$4,596.00	$0.00	$4,596.00	$0.00	160 h	0 h	0 h	160 h	0 h

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost

"Terminate L1 CTT/CTMcables" continued

Notes

WBS Definition-
Terminate previously installed cables (136, which run between the CTT and the cal-track match, and between L1 Cal and cal-track match). Task will be done during 2004 shutdown.
[1/05: task done].

M&S BOE -
NA

Labor BOE-
Run2a muon Level 1 experience terminating cables from muon front ends and CTT to the Level 1 muon triggers. Bob Jones group provides technicians.

1.5.6.1.7.6 Terminate L1 CTT/CTMcables -- Arizona — Mon 8/23/04 — Mon 9/20/04 — $0.00 — $0.00 — $0.00 — $0.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
12	PhysicistU	25%	$0.00	$0.00	$0.00	$0.00	40 h	0 h	0 h	40 h	0 h

Notes

WBS Definition-
Terminate previously installed cables (136, which run between the CTT and the cal-track match, and between L1 Cal and cal-track match). Task will be done during 2004 shutdown.
[1/05: task done].

M&S BOE -
NA

Labor BOE-
Run2a muon Level 1 experience terminating cables from muon front ends and CTT to the Level 1 muon triggers. Bob Jones group provides technicians.

1.5.6.1.7.7 Install L1CTT splitter crate and power supply — Mon 8/23/04 — Mon 9/20/04 — $0.00 — $0.00 — $1,886.00 — $1,886.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	10%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	16 h	0 h
37	SeniorElecEngF	25%	$1,886.00	$0.00	$1,886.00	$0.00	40 h	0 h	0 h	40 h	0 h
79	Jamieson Olson	25%	$0.00	$0.00	$0.00	$0.00	40 h	0 h	0 h	40 h	0 h
80	Stefan Grunendahl	10%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	16 h	0 h

Notes

WBS definition -
Install a single crate and its power supply on the platorm (in existing "bare" rack) to contain the serial link splitters which are used as repeaters to drive the signals from the L1CTT to the cal-trk. Needs to be done when there is access to the collision hall (preferably during 2004 shutdown), and must be done in advance of the end of run2a (it does not displace any existing equipment) for CTT precommissioning. SCL must also be routed from MCH1 to PC03 on the platform using an existing spare, and Gbit Ethernet from FCH2 to the platform.
[1/05: task done].

Labor BOE -
Experience with installation of splitter crates for run 2a, plus extra time allowed for installation of new electronics on the detector platform.

M&S BOE -
NA

1.5.6.1.7.8 Install L1CTM VME crates and power supply -FNAL — **Mon 8/23/04** — **Mon 8/23/04** — **$0.00** — **$0.00** — **$0.00** — **$0.00**

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
37	SeniorElecEngF	10%	$0.00	$0.00	$0.00	$0.00	0 h	0 h	0 h	0 h	0 h
72	John Anderson	10%	$0.00	$0.00	$0.00	$0.00	0 h	0 h	0 h	0 h	0 h

Notes

WBS Definition-
Install cal-trk crates and power supply in moveable counting house in existing rack. Can be done for initial testing before rack mods are completed (rack mods needed for final cable-up after CTM fully installed). Will use a Wiener PS. pORC needed (for boards) before test operation begins.
[1/05: crates and PS fully installed].

Labor BOE-
Run2a muon Level 1 experience with installation of similar VME crates and power supplies. Assumes two people at 50% FTE each for one week.

M&S BOE
NA

1.5.6.1.7.9 Install L1CTM VME crates and power supply - Az — Mon 8/23/04 — Fri 8/27/04 — $0.00 — $0.00 — $0.00 — $0.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
12	PhysicistU	100%	$0.00	$0.00	$0.00	$0.00	40 h	0 h	0 h	40 h	0 h
91	Susan Burke	100%	$0.00	$0.00	$0.00	$0.00	40 h	0 h	0 h	40 h	0 h

Notes

WBS Definition-
Install cal-trk crates and power supply in moveable counting house in existing rack. Can be done for initial testing before rack mods are completed (rack mods needed for final cable-up after CTM fully installed). Will use a Wiener PS. pORC needed (for boards) before test operation begins.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
"Install L1CTM VME crates and power supply - Az" continued							

Notes

[1/05: crates and PS fully installed].

Labor BOE-
Run2a muon Level 1 experience with installation of similar VME crates and power supplies. Assumes two people at 50% FTE each for one week.

M&S BOE
NA

1.5.6.1.8	**End of Fall 2004 Shutdown**	**Wed 12/1/04**	**Wed 12/1/04**	**$0.00**	**$0.00**	**$0.00**	**$0.00**

Notes

WBS Definition-
Milestone-End of Tevatron shutdown, Fall 2004.

1.5.6.1.9	Modify RunIIa L3/Offline Silicon Software -FNAL	Wed 1/19/05	Thu 7/21/05	$0.00	$0.00	$0.00	$0.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	100%	$0.00	$0.00	$0.00	$0.00	1,040 h	0 h	0 h	0 h	1,040 h
89	Shaoua Fu	100%	$0.00	$0.00	$0.00	$0.00	1,040 h	0 h	0 h	0 h	1,040 h

Notes

WBS Definition-
This task modifies the L3/offline software needed for the L0 silicon system at DAB. Included is simulation(D0gstar), unpacking and calibration, cluster reconstruction, L3 algorithms, track resonstruction(RECO), monitoring (Examine, event display).

M&S BOE-
NA

Labor BOE-
The effort estimates are made by assessing the time needed to make a series of well-defined modifications to the existing Run IIa software. The effort estimates and capable individuals are: simulation 8mw (Chabalina), unpacking and calibration 4 mw (Kulik, Zdrazil), cluster reconstruction 8mw (Barberis, Kulik), L3 algorithms 3mw (Illingworth), track reconstruction 6mw (Kulik, Khanov, Borisov), monitoring 12mw (Chabalina, Hesketh, Dean).

S. Fu (postdoc).

1.5.6.1.10	Modify RunIIa L3/Offline Silicon Software - U	Wed 1/19/05	Thu 7/21/05	$0.00	$0.00	$0.00	$0.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
12	PhysicistU	200%	$0.00	$0.00	$0.00	$0.00	2,080 h	0 h	0 h	0 h	2,080 h
88	Alexei Melnitchouk	100%	$0.00	$0.00	$0.00	$0.00	1,040 h	0 h	0 h	0 h	1,040 h

Notes

WBS Definition-
This task modifies the L3/offline software needed for the L0 silicon system at DAB. Included is simulation(D0gstar), unpacking and calibration, cluster reconstruction, L3 algorithms, track resonstruction(RECO), monitoring (Examine, event display).

M&S BOE-
NA

Labor BOE-
The effort estimates are made by assessing the time needed to make a series of well-defined modifications to the existing Run IIa software. The effort estimates and capable individuals are: simulation 8mw (Chabalina), unpacking and calibration 4 mw (Kulik, Zdrazil), cluster reconstruction 8mw (Barberis, Kulik), L3 algorithms 3mw (Illingworth), track reconstruction 6mw (Kulik, Khanov, Borisov), monitoring 12mw (Chabalina, Hesketh, Dean).

Alex Melnitchouk (U. Miss) postdoc, leads; Timwar ? grad student UIC, ?grad student KU

1.5.6.1.11	**Prepare Safety and PORC documentation**	**Mon 7/26/04**	**Thu 8/4/05**	**$0.00**	**$0.00**	**$11,376.00**	**$11,376.00**

Notes

WBS Definition-
This task provides effort the preparation of any required safety documentation (e.g. extended silicon HV and LV systems, Be beampipe handling procedures, etc.) and drafts the necessary PORC's so that only final "walk-thrus" are needed as installation is completed. The task is scheduled to begin somewhat arbitrarily 1 year before the beginning of the shutdown.

HV in 2005?
Beampipe leak check procedures. (Russ to review 2004 SNEG item)

M&S BOS-
None.

Labor BOE-
Ongoing physicist and engineering effort required to assure paperwork completion in a timely maner. Rich Smith, Russ Rucniski, Bill Cooper, Lyn Bagby, Youri Orlov, Dan Marlkey, are the preferred physicsts and engineers to prepare the documentation.

1.5.6.1.11.1	Prepare Si LVPS Safety and PORC Documentation	Mon 7/26/04	Fri 8/6/04	$0.00	$0.00	$1,886.00	$1,886.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	50%	$0.00	$0.00	$0.00	$0.00	40 h	0 h	0 h	40 h	0 h
37	SeniorElecEngF	50%	$1,886.00	$0.00	$1,886.00	$0.00	40 h	0 h	0 h	40 h	0 h
55	Linda Bagby	50%	$0.00	$0.00	$0.00	$0.00	40 h	0 h	0 h	40 h	0 h
72	John Anderson	50%	$0.00	$0.00	$0.00	$0.00	40 h	0 h	0 h	40 h	0 h

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost

"Prepare Si LVPS Safety and PORC Documentation" continued

Notes

WBS Definition-
This task provides effort for the preparation of the new SI Low Voltage Power Supply system and cooling interlock safety documentation and PORCS, including "walk-thrus" required for permission to operate the system.

M&S BOS-
None.

Labor BOE-
Based on RunIIa experience and considering that review/updating of existing documentation constitutes the bulk of the task, two weeks time by an electrical engineer, and physicist are required for this task. John Anderson and Lyn Bagby are the preferred personnel.

1.5.6.1.11.2	Prepare L0 Si Cooling Safety and PORC Documentation	Fri 7/22/05	Thu 8/4/05	$0.00	$0.00	$3,796.00	$3,796.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	10%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
39	SeniorMechEngF	100%	$3,796.00	$0.00	$0.00	$3,796.00	80 h	0 h	0 h	0 h	80 h
58	Bill Cooper	10%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
94	Dan Olis	100%	$0.00	$0.00	$0.00	$0.00	80 h	0 h	0 h	0 h	80 h

Notes

WBS Definition-
This task provides effort for the preparation of the Layer Zero Si cooling system safety documentation and PORCS, including "walk-thrus" required for permission to operate the system.

M&S BOS-
None.

Labor BOE-
Based on RunIIa experience and considering that review/updating of existing documentation constitutes the bulk of the task, two weeks time by an mechanical engineer, and supervision by a physicist are required for this task. Bill Cooper and Dan Olis are the preferred personnel.

1.5.6.1.11.3	Prepare L0 Si Dry Gas Safety and PORC Documentation	Fri 7/8/05	Thu 7/21/05	$0.00	$0.00	$3,796.00	$3,796.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	10%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
39	SeniorMechEngF	100%	$3,796.00	$0.00	$0.00	$3,796.00	80 h	0 h	0 h	0 h	80 h
58	Bill Cooper	10%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
94	Dan Olis	100%	$0.00	$0.00	$0.00	$0.00	80 h	0 h	0 h	0 h	80 h

Notes

WBS Definition-
This task provides effort for the preparation of the Layer Zero Si dry gas system safety documentation and PORCS, including "walk-thrus" required for permission to operate the system.

M&S BOS-
None.

Labor BOE-
Based on RunIIa experience and considering that review/updating of existing documentation constitutes the bulk of the task, two weeks time by an mechanical engineer, and supervision by a physicist are required for this task. Bill Cooper and Dan Olis are the preferred personnel.

1.5.6.1.11.4	Prepare Beampipe Handling Safety Documentation	Thu 6/16/05	Wed 6/29/05	$0.00	$0.00	$0.00	$0.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	100%	$0.00	$0.00	$0.00	$0.00	80 h	0 h	0 h	0 h	80 h
61	Rich Smith	100%	$0.00	$0.00	$0.00	$0.00	80 h	0 h	0 h	0 h	80 h

Notes

WBS Definition-
This task provides effort for the preparation of the beryllium beampipe safety documentation.

M&S BOS-
None.

Labor BOE-
Based on RunIIa experience and considering that review/updating of existing documentation constitutes the bulk of the task, one week time by a physicist is required for this task. Rich Smith is the preferred personnel.

1.5.6.1.11.5	Prepare Tevatron Beampipe Leak Checking Procedure	Fri 7/22/05	Thu 8/4/05	$0.00	$0.00	$1,898.00	$1,898.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
39	SeniorMechEngF	50%	$1,898.00	$0.00	$0.00	$1,898.00	40 h	0 h	0 h	0 h	40 h
59	Russ Rucinski	50%	$0.00	$0.00	$0.00	$0.00	40 h	0 h	0 h	0 h	40 h

Notes

WBS Definition-
This task provides effort for the preparation of the Tevatron beampipe leak checking safety documentation.

M&S BOS-
None.

Labor BOE-
Based on RunIIa experience and considering that review/updating of existing documentation constitutes the bulk of the task, one week time by an engineer is required for this task. Russ Rucinski is the preferred personnel.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.6.1.12	**Silicon Safety and PORC Documentation Completed**	Thu 8/4/05	Thu 8/4/05	$0.00	$0.00	$0.00	$0.00

Notes

WBS Definition-
All safety and PORC documentation for RunIIb are complete.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.6.2	**Silicon Infrastructure Prepared**	Thu 8/18/05	Thu 8/18/05	$0.00	$0.00	$0.00	$0.00

Notes

WBS Definition-
Milestone-All infrastructure required by the silicon (cables, chiller and piping, dry gas system, HV and LV systems, installation fixtures) is complete.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.6.3	**Open Detector, Install Gap Access Hardware**	Mon 10/3/05	Wed 10/5/05	$0.00	$0.00	$4,246.20	$4,246.20

Notes

WBS Definition-
This summary task opens the forward muon shields, isolates and backfills Tev beampipe, installs remote purge lines to crosses at quads, removes FPD veto counters on SNEG pipes, opens EF's, removes BLM's from EF's, opens CF's, opens ES's, and prepares the CC-EC gaps for access (scaffolds, lighting, masks to protect CFT fibers).

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.6.3.1	Perform Rad survey, open forward muon shields	Mon 10/3/05	Mon 10/3/05	$0.00	$0.00	$554.50	$554.50

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	50%	$0.00	$0.00	$0.00	$0.00	2 h	0 h	0 h	0 h	2 h
39	SeniorMechEngF	50%	$94.90	$0.00	$0.00	$94.90	2 h	0 h	0 h	0 h	2 h
40	SeniorMechTechF	400%	$459.60	$0.00	$0.00	$459.60	16 h	0 h	0 h	0 h	16 h
59	Russ Rucinski	50%	$0.00	$0.00	$0.00	$0.00	2 h	0 h	0 h	0 h	2 h

Notes

WBS Definition-
This task performs the required rad survey of the collision hall before general personnel access permitted, opens forward muon shielding (but leaves bridges in place).

M&S BOE-
NA

Labor BOE-
RunIIa experience where these tasks were done on several occasions, forms the basis of estimate for effort.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.6.3.2	Install Tev BP purge, Remove FPD Vetoes, Open EF's	Mon 10/3/05	Mon 10/3/05	$0.00	$0.00	$554.50	$554.50

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
39	SeniorMechEngF	50%	$94.90	$0.00	$0.00	$94.90	2 h	0 h	0 h	0 h	2 h
40	SeniorMechTechF	400%	$459.60	$0.00	$0.00	$459.60	16 h	0 h	0 h	0 h	16 h
59	Russ Rucinski	50%	$0.00	$0.00	$0.00	$0.00	2 h	0 h	0 h	0 h	2 h

Notes

WBS Definition-
This task isolates and backfills Tev beampipe through D0, installs remote purge lines at crosses by quads, measures and removes FPD veto counters, measures location of EC flanges, measures N&S quad bellows assembly length, retracts forward muon bridges, opens EF's

M&S BOE-
NA

Labor BOE-
RunIIa experience where these tasks were done during 2004 shutdown.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.6.3.3	Open CF's, EC's, Install Gap Access Hardware, Make Rad sur	Tue 10/4/05	Wed 10/5/05	$0.00	$0.00	$3,137.20	$3,137.20

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
39	SeniorMechEngF	50%	$379.60	$0.00	$0.00	$379.60	8 h	0 h	0 h	0 h	8 h
40	SeniorMechTechF	600%	$2,757.60	$0.00	$0.00	$2,757.60	96 h	0 h	0 h	0 h	96 h
49	GapN	200%	$0.00	$0.00	$0.00	$0.00	32 h	0 h	0 h	0 h	32 h
50	GapS	200%	$0.00	$0.00	$0.00	$0.00	32 h	0 h	0 h	0 h	32 h
59	Russ Rucinski	50%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h

Notes

WBS Definition-
This task removes BLM's from EF's, measures location of EC beampipe flange, opens CF's, opens EC's, installs gap access hardware (scaffolds, lighting), makes rad survey of exposed beampipe and calorimeter surfaces.

M&S BOE-
NA

Labor BOE-
RunIIa experience where this task was done (especially during the 2004 shutdown) forms the basis of estimate.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.6.3.4	Warm Silicon	Wed 10/5/05	Wed 10/5/05	$0.00	$0.00	$0.00	$0.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	50%	$0.00	$0.00	$0.00	$0.00	4 h	0 h	0 h	0 h	4 h
58	Bill Cooper	50%	$0.00	$0.00	$0.00	$0.00	4 h	0 h	0 h	0 h	4 h

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
"Warm Silicon" continued							

Notes

WBS Definition-
This task warms the silicon above CH dewpoint.

M&S BOE-
NA

Labor BOE-
RunIIa experience where thiese operations were done during 2004 shutdown forms the basis of estimate.

1.5.6.4	**Silicon Warm, Detector Open & Ready for Access**	**Wed 10/5/05**	**Wed 10/5/05**	**$0.00**	**$0.00**	**$0.00**	**$0.00**

Notes

WBS Definition-
Milestone-Be beampipe disconnected from EC beampipes. First Be assay wipes out for analysis.

1.5.6.5	**Drain Silicon Coolant, Disconnect Inner Beampipes**	**Thu 10/6/05**	**Mon 10/10/05**	**$0.00**	**$0.00**	**$1,109.00**	**$1,109.00**

Notes

WBS Definition-
This summary task closes EF's/EC's, removes SNEG pipes, drains Si coolant, Opens EC's/EF's, cuts off inner beampipes, purges Si coolant lines.

1.5.6.5.1	Be Assay	Thu 10/6/05	Thu 10/6/05	$0.00	$0.00	$0.00	$0.00

Notes

WBS Definition-
This task stops dry gas purge, removes tedlar cover, perform Be wipe.

M&S BOE-
NA

Labor BOE-
RunIIa experience where thiese operations were done during 2004 shutdown forms the basis of estimate. (Resources loaded in following task).

1.5.6.5.2	Rad Survey, Disconnect EC/Be joints	Mon 10/10/05	Mon 10/10/05	$0.00	$0.00	$1,109.00	$1,109.00

ID	*Resource Name*	*Units*	*Cost*	*Baseline Cost*	*Act. Cost*	*Rem. Cost*	*Work*	*Ovt. Work*	*Baseline Work*	*Act. Work*	*Rem. Work*
39	*SeniorMechEngF*	*50%*	*$189.80*	*$0.00*	*$0.00*	*$189.80*	*4 h*	*0 h*	*0 h*	*0 h*	*4 h*
40	*SeniorMechTechF*	*400%*	*$919.20*	*$0.00*	*$0.00*	*$919.20*	*32 h*	*0 h*	*0 h*	*0 h*	*32 h*
49	*GapN*	*200%*	*$0.00*	*$0.00*	*$0.00*	*$0.00*	*16 h*	*0 h*	*0 h*	*0 h*	*16 h*
50	*GapS*	*200%*	*$0.00*	*$0.00*	*$0.00*	*$0.00*	*16 h*	*0 h*	*0 h*	*0 h*	*16 h*
59	*Russ Rucinski*	*50%*	*$0.00*	*$0.00*	*$0.00*	*$0.00*	*4 h*	*0 h*	*0 h*	*0 h*	*4 h*

Notes

WBS Definition-
This task removes foam, G10 for TLD',s removes bellows protectors at EC/Be joints, opens joints, compress and restrain bellows, establish GN2 purge of Be pipe, and outflow purge bags at EC pipes. Make Rad survey of beampipe regions.

M&S BOE-
NA

Labor BOE-
RunIIa experience where thiese operations were done during 2004 shutdown forms the basis of estimate.

1.5.6.5.3	**Inner Beampipes Disconnected**	**Mon 10/10/05**	**Mon 10/10/05**	**$0.00**	**$0.00**	**$0.00**	**$0.00**

Notes

WBS Definition-
Milestone-Be beampipe disconnected from EC beampipes. First Be assay wipes out for analysis.

1.5.6.6	**Disconnect Outer Beampipes**	**Tue 10/11/05**	**Mon 10/17/05**	**$0.00**	**$0.00**	**$6,574.00**	**$6,574.00**
1.5.6.6.1	Close EC's, EF's, Remove SNEG Pipes	Tue 10/11/05	Tue 10/11/05	$0.00	$0.00	$1,948.20	$1,948.20

ID	*Resource Name*	*Units*	*Cost*	*Baseline Cost*	*Act. Cost*	*Rem. Cost*	*Work*	*Ovt. Work*	*Baseline Work*	*Act. Work*	*Rem. Work*
39	*SeniorMechEngF*	*150%*	*$569.40*	*$0.00*	*$0.00*	*$569.40*	*12 h*	*0 h*	*0 h*	*0 h*	*12 h*
40	*SeniorMechTechF*	*600%*	*$1,378.80*	*$0.00*	*$0.00*	*$1,378.80*	*48 h*	*0 h*	*0 h*	*0 h*	*48 h*
59	*Russ Rucinski*	*50%*	*$0.00*	*$0.00*	*$0.00*	*$0.00*	*4 h*	*0 h*	*0 h*	*0 h*	*4 h*
94	*Dan Olis*	*100%*	*$0.00*	*$0.00*	*$0.00*	*$0.00*	*8 h*	*0 h*	*0 h*	*0 h*	*8 h*

Notes

WBS Definition-
This task removes gap access hardware, closes EC's and EF's, extends shield bridges, removes the bellows, cross, and tee from the N quad isolation gate valve, removes SNEG pipes, temporarily stoppers EC beampipes, moves gas purge line from tees to EC beampipes, retract shield bridges.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
"Close EC's, EF's, Remove SNEG Pipes" continued							

Notes

M&S BOE-
NA

Labor BOE-
RunIIa experience where this task was done during 2004 shutdown forms the basis of estimate.

1.5.6.6.2	Open EF's, Open EC's, Install TempMon Cables, Drain Si Coo	Wed 10/12/05	Thu 10/13/05	$0.00	$0.00	$3,137.20	$3,137.20

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	20%	$0.00	$0.00	$0.00	$0.00	3.2 h	0 h	0 h	0 h	3.2 h
39	SeniorMechEngF	50%	$379.60	$0.00	$0.00	$379.60	8 h	0 h	0 h	0 h	8 h
40	SeniorMechTechF	600%	$2,757.60	$0.00	$0.00	$2,757.60	96 h	0 h	0 h	0 h	96 h
49	GapN	200%	$0.00	$0.00	$0.00	$0.00	32 h	0 h	0 h	0 h	32 h
50	GapS	200%	$0.00	$0.00	$0.00	$0.00	32 h	0 h	0 h	0 h	32 h
55	Linda Bagby	20%	$0.00	$0.00	$0.00	$0.00	3.2 h	0 h	0 h	0 h	3.2 h
59	Russ Rucinski	50%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h

Notes

WBS Definition-
This task opens EF's, opens EC's, installs gap access hardware (scaffolds, lighting). Take advantage of open gaps to install temperature monitoring cables for the L0 detector (12 cbles from horseshoe area to DMarkley chassis in Platform). Shut off and drain silicon cooling system (check tritium content of coolant).

M&S BOE-
NA

Labor BOE-
RunIIa experience where opening detector was done repeatedly forms the basis of estimate.

1.5.6.6.3	Power Outage in Collision Hall	Fri 10/14/05	Fri 10/14/05	$0.00	$0.00	$0.00	$0.00

Notes

WBS Definition-
This task provides 1-day window for power outage in collision hall.

M&S BOE-
NA

Labor BOE-
NA

1.5.6.6.4	Cut Off Inner EC Beampipes, Purge Si Coolant lines	Mon 10/17/05	Mon 10/17/05	$0.00	$0.00	$1,488.60	$1,488.60

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
39	SeniorMechEngF	150%	$569.40	$0.00	$0.00	$569.40	12 h	0 h	0 h	0 h	12 h
40	SeniorMechTechF	400%	$919.20	$0.00	$0.00	$919.20	32 h	0 h	0 h	0 h	32 h
49	GapN	200%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
50	GapS	200%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
59	Russ Rucinski	50%	$0.00	$0.00	$0.00	$0.00	4 h	0 h	0 h	0 h	4 h
94	Dan Olis	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h

Notes

WBS Definition-
This task cuts EC beampipe cuffs at reducers, measures temperataures of EC beampipes, reestablishes purge in beampipes, purge silicon coolant lines.

M&S BOE-
NA

Labor BOE-
RunIIa experience working with beampipes in the gaps forms the basis of estimate.

1.5.6.7	**Outer Beampipes Disconnected**	**Mon 10/17/05**	**Mon 10/17/05**	**$0.00**	**$0.00**	**$0.00**	**$0.00**

Notes

WBS Definition-
Milestone-Ready for removal of inner, outer H-disks.

1.5.6.8	**Remove H-disks**	**Tue 10/18/05**	**Mon 10/24/05**	**$0.00**	**$0.00**	**$7,443.00**	**$7,443.00**

Notes

WBS Definition-

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
"Remove H-disks" continued							

Notes
This summary task uncables and removes H-disks.

1.5.6.8.1	Remove Be Pipe support and make Be Assay	Tue 10/18/05	Tue 10/18/05	$0.00	$0.00	$0.00	$0.00

Notes
WBS Definition-
This task removes split Rohacell Be beam pipe supports, and makes Be assy of newly exposed Be beampipe.

M&S BOE-
NA

Labor BOE-
Estimates are based on Run2a installation experience, reduced by considerations of the expected simpler task of removal as compared with installation. Resources loaded in following task.

1.5.6.8.2	Uncable & Remove N&S Outer H-Disks	Tue 10/18/05	Thu 10/20/05	$0.00	$0.00	$4,465.80	$4,465.80

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	125%	$0.00	$0.00	$0.00	$0.00	30 h	0 h	0 h	0 h	30 h
39	SeniorMechEngF	150%	$1,708.20	$0.00	$0.00	$1,708.20	36 h	0 h	0 h	0 h	36 h
40	SeniorMechTechF	400%	$2,757.60	$0.00	$0.00	$2,757.60	96 h	0 h	0 h	0 h	96 h
49	GapN	200%	$0.00	$0.00	$0.00	$0.00	48 h	0 h	0 h	0 h	48 h
50	GapS	200%	$0.00	$0.00	$0.00	$0.00	48 h	0 h	0 h	0 h	48 h
55	Linda Bagby	100%	$0.00	$0.00	$0.00	$0.00	24 h	0 h	0 h	0 h	24 h
56	Dave Butler	100%	$0.00	$0.00	$0.00	$0.00	24 h	0 h	0 h	0 h	24 h
58	Bill Cooper	25%	$0.00	$0.00	$0.00	$0.00	6 h	0 h	0 h	0 h	6 h
94	Dan Olis	50%	$0.00	$0.00	$0.00	$0.00	12 h	0 h	0 h	0 h	12 h
95	Joe Howell	100%	$0.00	$0.00	$0.00	$0.00	24 h	0 h	0 h	0 h	24 h

Notes
WBS Definition-
This task disconnects air purge and coolant lines to N&S outer H-disks, disconnects and removes the low mass cables (24 per side), installs the H-disk removal fixture, and removes the outer H-disks from CFT barrel 3. The H disks are inserted in existing handling cases and removed from the work area. Change H-disk coolant flow nozzels for L0 if necessary. Remap the low mass cables from the inner H-disks at the adapter cards.
It is assumed this work can proceed while the results of the Be assay on the beampipe are pending.

M&S BOE-
NA

Labor BOE-
Estimates are based on Run2a installation experience, reduced by considerations of the expected simpler task of removal as compared with installation.

1.5.6.8.3	Uncable & Remove N&S Inner H-Disks, Be assay of BP	Fri 10/21/05	Mon 10/24/05	$0.00	$0.00	$2,977.20	$2,977.20

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	125%	$0.00	$0.00	$0.00	$0.00	20 h	0 h	0 h	0 h	20 h
39	SeniorMechEngF	150%	$1,138.80	$0.00	$0.00	$1,138.80	24 h	0 h	0 h	0 h	24 h
40	SeniorMechTechF	400%	$1,838.40	$0.00	$0.00	$1,838.40	64 h	0 h	0 h	0 h	64 h
49	GapN	200%	$0.00	$0.00	$0.00	$0.00	32 h	0 h	0 h	0 h	32 h
50	GapS	200%	$0.00	$0.00	$0.00	$0.00	32 h	0 h	0 h	0 h	32 h
55	Linda Bagby	100%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
56	Dave Butler	100%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
58	Bill Cooper	25%	$0.00	$0.00	$0.00	$0.00	4 h	0 h	0 h	0 h	4 h
94	Dan Olis	50%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
95	Joe Howell	100%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
98	Sasha Leflat	100%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h

Notes
WBS Definition-
This task isolates N&S inner H-disk air and coolant lines, decables the disks (temporarily dresses cables to out-of-the-way locations), installs the H-disk removal fixture, and removes the inner Hdisks from CFT barrel 3. The task assumes the Be assay of the beampipe was permissive. The H disks are inserted in existing handling cases and removed from the work area. Make Be wiipes of exposed Be beampipe.

M&S BOE-
NA

Labor BOE-
Estimates are based on Run2a installation experience, reduced by considerations of the expected simpler task of removal as compared with installation.

1.5.6.9	**H-disks Removal Complete**	**Mon 10/24/05**	**Mon 10/24/05**	**$0.00**	**$0.00**	**$0.00**	**$0.00**

Notes
WBS Definition-
Milestone-H-disk Removal Complete

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.6.10	**Remove Run IIa Be Beampipe, Load Long L0 Insertion Toc**	**Tue 10/25/05**	**Mon 10/31/05**	**$0.00**	**$0.00**	**$6,925.40**	**$6,925.40**

Notes

WBS Definition-
This summary task removes RunIIa Be Beampipe.

1.5.6.10.1	Install RunIIa Be BP Handling Fixture in S Gap, Brunson in N (	Tue 10/25/05	Tue 10/25/05	$0.00	$0.00	$1,408.60	$1,408.60

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	50%	$0.00	$0.00	$0.00	$0.00	4 h	0 h	0 h	0 h	4 h
39	SeniorMechEngF	250%	$949.00	$0.00	$0.00	$949.00	20 h	0 h	0 h	0 h	20 h
40	SeniorMechTechF	200%	$459.60	$0.00	$0.00	$459.60	16 h	0 h	0 h	0 h	16 h
50	GapS	200%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
56	Dave Butler	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
58	Bill Cooper	50%	$0.00	$0.00	$0.00	$0.00	4 h	0 h	0 h	0 h	4 h
59	Russ Rucinski	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
64	Dennis Graham	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
74	Youri Orlov	50%	$0.00	$0.00	$0.00	$0.00	4 h	0 h	0 h	0 h	4 h
93	Mike Roman	50%	$0.00	$0.00	$0.00	$0.00	4 h	0 h	0 h	0 h	4 h
94	Dan Olis	50%	$0.00	$0.00	$0.00	$0.00	4 h	0 h	0 h	0 h	4 h

Notes

WBS Definition-
This task installs the RunIIa beampipe handling fixture in the S gap, mounts Brunson in N gap to sight clearances of beampipe during removal.

M&S BOE-
NA

Labor BOE-
RunIIa experience from original Be pipe installation.

1.5.6.10.2	Remove Be pipe supports, Retract Be pipe to SEC	Wed 10/26/05	Wed 10/26/05	$0.00	$0.00	$1,218.80	$1,218.80

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	50%	$0.00	$0.00	$0.00	$0.00	4 h	0 h	0 h	0 h	4 h
39	SeniorMechEngF	200%	$759.20	$0.00	$0.00	$759.20	16 h	0 h	0 h	0 h	16 h
40	SeniorMechTechF	200%	$459.60	$0.00	$0.00	$459.60	16 h	0 h	0 h	0 h	16 h
49	GapN	200%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
50	GapS	200%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
56	Dave Butler	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
58	Bill Cooper	50%	$0.00	$0.00	$0.00	$0.00	4 h	0 h	0 h	0 h	4 h
59	Russ Rucinski	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
64	Dennis Graham	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
74	Youri Orlov	50%	$0.00	$0.00	$0.00	$0.00	4 h	0 h	0 h	0 h	4 h
94	Dan Olis	50%	$0.00	$0.00	$0.00	$0.00	4 h	0 h	0 h	0 h	4 h

Notes

WBS Definition-
This task removes the S Be supports from the S Si support membrane, slides the Be pipe ~15" S, attaches fixture to S end of beampipe, removes the N Be supports from the N Si support membrane, continue sliding Be pipe into SEC beampipe and establish purge in SEC beampipe. Remove beampipe handling fixtures from S gap, set position of SEC beampipe for minimum clearance to Si membrand when SEC closes.

M&S BOE-
NA

Labor BOE-
RunIIa experience from original Be pipe installation forms the basis of estimate for effort.

1.5.6.10.3	Install New Adapter Cards, LV cables in N Gap	Thu 10/27/05	Mon 10/31/05	$0.00	$0.00	$2,160.00	$2,160.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
8	ElecTechSF	100%	$720.00	$0.00	$0.00	$720.00	24 h	0 h	0 h	0 h	24 h
11	PhysicistF	100%	$0.00	$0.00	$0.00	$0.00	24 h	0 h	0 h	0 h	24 h
38	SeniorElecTechF	200%	$1,440.00	$0.00	$0.00	$1,440.00	48 h	0 h	0 h	0 h	48 h
49	GapN	200%	$0.00	$0.00	$0.00	$0.00	48 h	0 h	0 h	0 h	48 h
55	Linda Bagby	100%	$0.00	$0.00	$0.00	$0.00	24 h	0 h	0 h	0 h	24 h
69	John Fogelsong	100%	$0.00	$0.00	$0.00	$0.00	24 h	0 h	0 h	0 h	24 h

Notes

WBS Definition-
This task removes the Brunson from the N gap, removes old Adapter Cards and standoffs, installs new standoffs and AC's, installs LV and Temp Mon AWG-change panels, connects 12 10AWG LV cable from fuse panel to AWG-change panel, 22 AWG jumpers from AWG-change panel to AC. Operates power supplies.
Time is allowed to test AC's with walking Junction card.

M&S BOE-
NA

Labor BOE-
RunIIa experience from original AC installation forms the basis of estimate for effort.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.6.10.4	Close SEC, EFS, Install SEF Scaffolds	Thu 10/27/05	Thu 10/27/05	$0.00	$0.00	$1,488.60	$1,488.60

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	20%	$0.00	$0.00	$0.00	$0.00	1.6 h	0 h	0 h	0 h	1.6 h
39	SeniorMechEngF	150%	$569.40	$0.00	$0.00	$569.40	12 h	0 h	0 h	0 h	12 h
40	SeniorMechTechF	400%	$919.20	$0.00	$0.00	$919.20	32 h	0 h	0 h	0 h	32 h
49	GapN	200%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
56	Dave Butler	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
58	Bill Cooper	20%	$0.00	$0.00	$0.00	$0.00	1.6 h	0 h	0 h	0 h	1.6 h
59	Russ Rucinski	50%	$0.00	$0.00	$0.00	$0.00	4 h	0 h	0 h	0 h	4 h
64	Dennis Graham	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
74	Youri Orlov	50%	$0.00	$0.00	$0.00	$0.00	4 h	0 h	0 h	0 h	4 h
93	Mike Roman	50%	$0.00	$0.00	$0.00	$0.00	4 h	0 h	0 h	0 h	4 h

Notes

WBS Definition-
This task removes the S gap fixture and access hardware, closes ECS and SEF, erects scaffolds at downstream end of SEF (E side) and muon shield bridge arms.

M&S BOE-
NA

Labor BOE-
RunIIa experience from original Be pipe installation and manipulation of EC's forms the basis of estimate for effort.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.6.10.5	Remove RunIIa Be Pipe, Insert Long L0 Installation tool in EC	Fri 10/28/05	Fri 10/28/05	$0.00	$0.00	$649.40	$649.40

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	50%	$0.00	$0.00	$0.00	$0.00	4 h	0 h	0 h	0 h	4 h
39	SeniorMechEngF	50%	$189.80	$0.00	$0.00	$189.80	4 h	0 h	0 h	0 h	4 h
40	SeniorMechTechF	200%	$459.60	$0.00	$0.00	$459.60	16 h	0 h	0 h	0 h	16 h
56	Dave Butler	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
58	Bill Cooper	50%	$0.00	$0.00	$0.00	$0.00	4 h	0 h	0 h	0 h	4 h
59	Russ Rucinski	50%	$0.00	$0.00	$0.00	$0.00	4 h	0 h	0 h	0 h	4 h
64	Dennis Graham	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
74	Youri Orlov	50%	$0.00	$0.00	$0.00	$0.00	4 h	0 h	0 h	0 h	4 h

Notes

WBS Definition-
This task unblanks SEC beampipe, removes RunIIa Be pipe into storage container, installs long L0 Installation tool in ECS, reestablishes purge of SEC beampipe. Remove Be pipe from Collision Hall, store in Si cooling equipment cage.

M&S BOE-
NA

Labor BOE-
RunIIa experience from original Be pipe installation forms the basis of estimate for effort.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.6.11	**Run IIa Beampipe Removal Complete**	**Fri 10/28/05**	**Fri 10/28/05**	**$0.00**	**$0.00**	**$0.00**	**$0.00**

Notes

WBS Definition-
Milestone-RunIIa Be pipe removal completed.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.6.12	**Load L0 in ECN Beampipe**	**Fri 9/9/05**	**Tue 11/8/05**	**$0.00**	**$0.00**	**$13,424.72**	**$13,424.72**

Notes

WBS Definition-
This summary task brings L0 to DAB and loads it in the NEC beampipe.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.6.12.1	Open SEF, SEC, Install L0 Installation Fixtures in S gap	Mon 10/31/05	Tue 11/1/05	$0.00	$0.00	$3,356.80	$3,356.80

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	50%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
39	SeniorMechEngF	200%	$1,518.40	$0.00	$0.00	$1,518.40	32 h	0 h	0 h	0 h	32 h
40	SeniorMechTechF	400%	$1,838.40	$0.00	$0.00	$1,838.40	64 h	0 h	0 h	0 h	64 h
50	GapS	200%	$0.00	$0.00	$0.00	$0.00	32 h	0 h	0 h	0 h	32 h
58	Bill Cooper	50%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
74	Youri Orlov	100%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
93	Mike Roman	100%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h

Notes

WBS Definition-
This task removes the scaffolds near EFS, opens EFS, opens ECS, installs S gap access hardware, installs L0 table, rails, and levels from CC face, in S gap.

M&S BOE-
NA

Labor BOE-
RunIIa experience manipulating end calorimeters and working in the gaps forms the basis of estimate for effort.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.6.12.2	Install New Adapter Cards in S Gap	Wed 11/2/05	Fri 11/4/05	$0.00	$0.00	$1,440.00	$1,440.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	100%	$0.00	$0.00	$0.00	$0.00	24 h	0 h	0 h	0 h	24 h
38	SeniorElecTechF	200%	$1,440.00	$0.00	$0.00	$1,440.00	48 h	0 h	0 h	0 h	48 h
50	GapS	200%	$0.00	$0.00	$0.00	$0.00	48 h	0 h	0 h	0 h	48 h
55	Linda Bagby	100%	$0.00	$0.00	$0.00	$0.00	24 h	0 h	0 h	0 h	24 h

Notes

WBS Definition-
This task removes old AC's and standoffs, installs new standoffs and AC's, installs LV and Temp Mon AWG-change panels, connects 12 10AWG LV cable from fuse panel to AWG-change panel, 22 AWG jumpers from AWG-change panel to AC. Operates power supplies.
Time is allowed to test AC's with walking Junction card.

M&S BOE-
NA

Labor BOE-
RunIIa experience from original AC installation forms the basis of estimate for effort.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.6.12.3	Close NEC, NEF, Erect NEF scaffold	Tue 11/1/05	Wed 11/2/05	$0.00	$0.00	$2,833.52	$2,833.52

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
39	SeniorMechEngF	10%	$75.92	$0.00	$0.00	$75.92	1.6 h	0 h	0 h	0 h	1.6 h
40	SeniorMechTechF	600%	$2,757.60	$0.00	$0.00	$2,757.60	96 h	0 h	0 h	0 h	96 h
49	GapN	200%	$0.00	$0.00	$0.00	$0.00	32 h	0 h	0 h	0 h	32 h
59	Russ Rucinski	10%	$0.00	$0.00	$0.00	$0.00	1.6 h	0 h	0 h	0 h	1.6 h

Notes

WBS Definition-
This task removes N gap access hardware, closes NEC, closes NEF, extends the muon shielding bridge arms, erects scaffolds at downstream side of NEF (E side).

M&S BOE-
NA

Labor BOE-
RunIIa experience manipulation EC's and EF's.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.6.12.4	Mount L0 Installation Fixture to NEF, Move Dummy L0 to NEF	Thu 11/3/05	Thu 11/3/05	$0.00	$0.00	$1,218.80	$1,218.80

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	50%	$0.00	$0.00	$0.00	$0.00	4 h	0 h	0 h	0 h	4 h
39	SeniorMechEngF	200%	$759.20	$0.00	$0.00	$759.20	16 h	0 h	0 h	0 h	16 h
40	SeniorMechTechF	200%	$459.60	$0.00	$0.00	$459.60	16 h	0 h	0 h	0 h	16 h
56	Dave Butler	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
58	Bill Cooper	50%	$0.00	$0.00	$0.00	$0.00	4 h	0 h	0 h	0 h	4 h
59	Russ Rucinski	50%	$0.00	$0.00	$0.00	$0.00	4 h	0 h	0 h	0 h	4 h
64	Dennis Graham	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
74	Youri Orlov	50%	$0.00	$0.00	$0.00	$0.00	4 h	0 h	0 h	0 h	4 h
94	Dan Olis	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h

Notes

WBS Definition-
This task installs L0 installation fixture, rehearses with dummy pipe of L0 size the motion into N EC beampipe.

M&S BOE-
NA

Labor BOE-
RunIIa experience and consideration of installation of fixture on scaffolds.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.6.12.5	Transport L0 to DAB	Fri 9/9/05	Fri 9/9/05	$0.00	$0.00	$0.00	$0.00

Notes

WBS Definition-
This task transports L0 to DAB.

M&S BOE-
NA

Labor BOE-
RunIIa experience forms the basis of estimate.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.6.12.6	Mount Survey Instrument in S Gap	Wed 11/2/05	Wed 11/2/05	$0.00	$0.00	$0.00	$0.00

Notes

WBS Definition-
This task mounts an optical survey telescope in S gap to align L0 installation tool on N EC.

M&S BOE-
NA

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost

"Mount Survey Instrument in S Gap" continued

Notes

Labor BOE-
RunIIa experience (2004 shutdown) forms the basis of estimate.

1.5.6.12.7	Insert L0 in NEC Beampipe, Load Be Beampipel behind it	Fri 11/4/05	Fri 11/4/05	$0.00	$0.00	$1,218.80	$1,218.80

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	50%	$0.00	$0.00	$0.00	$0.00	4 h	0 h	0 h	0 h	4 h
39	SeniorMechEngF	200%	$759.20	$0.00	$0.00	$759.20	16 h	0 h	0 h	0 h	16 h
40	SeniorMechTechF	200%	$459.60	$0.00	$0.00	$459.60	16 h	0 h	0 h	0 h	16 h
58	Bill Cooper	50%	$0.00	$0.00	$0.00	$0.00	4 h	0 h	0 h	0 h	4 h
74	Youri Orlov	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
94	Dan Olis	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h

Notes

WBS Definition-
This task transports L0 silicon from SiDet to DAB, moves it into the collision hall and inserts it into the NEC beampipe. The purge in the beampipe is restarted after L0 and the RunIIb Be beampipe are stored there.

M&S BOE-
NA

Labor BOE-
Estimate based on Run2a experience, for which operation is essentially identical; included is effort required to maintain gas purge during move, load detector into transport vehicle at SiDet, and unload detector at DAB, all the while maintaining specified low shock loadings and accelerations.

1.5.6.12.8	Open EFN & NEC, Install L0 Installation Fixtures in N gap	Mon 11/7/05	Tue 11/8/05	$0.00	$0.00	$3,356.80	$3,356.80

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	100%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
39	SeniorMechEngF	200%	$1,518.40	$0.00	$0.00	$1,518.40	32 h	0 h	0 h	0 h	32 h
40	SeniorMechTechF	400%	$1,838.40	$0.00	$0.00	$1,838.40	64 h	0 h	0 h	0 h	64 h
49	GapN	200%	$0.00	$0.00	$0.00	$0.00	32 h	0 h	0 h	0 h	32 h
56	Dave Butler	100%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
58	Bill Cooper	100%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
59	Russ Rucinski	100%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
64	Dennis Graham	100%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
74	Youri Orlov	100%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
94	Dan Olis	100%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h

Notes

WBS Definition-
This task removes the scaffolding downstream of EFN, opens EFN and NEC, installs the gap access hardware in the N gap, and installs the L0 installation table, rails, and level from CC in the N gap.

M&S BOE-
NA

Labor BOE-
RunIIa experience manipulating the EC's and EF's, and consideration of handling fixtures in the gap.

1.5.6.13	**L0 Loaded in ECN Beampipe**	**Tue 11/8/05**	**Tue 11/8/05**	**$0.00**	**$0.00**	**$0.00**	**$0.00**

Notes

WBS Definition-
Milestone-L0 Loaded in ECN beampipe.

1.5.6.14	**Prepare Gaps for L0 Insertion**	**Wed 11/9/05**	**Tue 11/15/05**	**$0.00**	**$0.00**	**$4,875.20**	**$4,875.20**

Notes

WBS Definition-
This summary prepares gaps for final insertion of L0 into RunIIa SMT.

1.5.6.14.1	Align N Rails with Brunson in S Gap	Wed 11/9/05	Wed 11/9/05	$0.00	$0.00	$989.00	$989.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
39	SeniorMechEngF	200%	$759.20	$0.00	$0.00	$759.20	16 h	0 h	0 h	0 h	16 h
40	SeniorMechTechF	100%	$229.80	$0.00	$0.00	$229.80	8 h	0 h	0 h	0 h	8 h
50	GapS	200%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
58	Bill Cooper	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
74	Youri Orlov	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
93	Mike Roman	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h

Notes

WBS Definition-
This task positions the Brunson in the S gap and aligns the installation rails in the N gap.

M&S BOE-
NA

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
"Align N Rails with Brunson in S Gap" continued							

Notes

Labor BOE-
RunIIa experience with use of Brunson in gaps during Fall 2004 shutdown..

1.5.6.14.2	Align S Rails with Brunson in N Gap	Thu 11/10/05	Thu 11/10/05	$0.00	$0.00	$989.00	$989.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
39	SeniorMechEngF	200%	$759.20	$0.00	$0.00	$759.20	16 h	0 h	0 h	0 h	16 h
40	SeniorMechTechF	100%	$229.80	$0.00	$0.00	$229.80	8 h	0 h	0 h	0 h	8 h
49	GapN	200%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
58	Bill Cooper	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
74	Youri Orlov	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
93	Mike Roman	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h

Notes

WBS Definition-
This task positions the Brunson in the N gap and aligns the installation rails in the S gap.

M&S BOE-
NA

Labor BOE-
RunIIa experience with use of Brunson in gaps during Fall 2004 shutdown..

1.5.6.14.3	Install Long L0 Installation Tool on S rails	Fri 11/11/05	Fri 11/11/05	$0.00	$0.00	$1,218.80	$1,218.80

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	50%	$0.00	$0.00	$0.00	$0.00	4 h	0 h	0 h	0 h	4 h
39	SeniorMechEngF	200%	$759.20	$0.00	$0.00	$759.20	16 h	0 h	0 h	0 h	16 h
40	SeniorMechTechF	200%	$459.60	$0.00	$0.00	$459.60	16 h	0 h	0 h	0 h	16 h
49	GapN	200%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
50	GapS	200%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
56	Dave Butler	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
58	Bill Cooper	50%	$0.00	$0.00	$0.00	$0.00	4 h	0 h	0 h	0 h	4 h
59	Russ Rucinski	50%	$0.00	$0.00	$0.00	$0.00	4 h	0 h	0 h	0 h	4 h
64	Dennis Graham	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
74	Youri Orlov	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
93	Mike Roman	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h

Notes

WBS Definition-
This task moves L0 long installation tool from SEC beampipe onto rails in S gap (reestablishes purge in ECS beampipe), checks motion of tool with weight added which simulates L0.

M&S BOE-
NA

Labor BOE-
RunIIa experience with beampipe mounts, plus consideration of moving long tool from ECS beampipe.

1.5.6.14.4	Install L0 mounts on SMT	Mon 11/14/05	Tue 11/15/05	$0.00	$0.00	$1,678.40	$1,678.40

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	100%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
39	SeniorMechEngF	100%	$759.20	$0.00	$0.00	$759.20	16 h	0 h	0 h	0 h	16 h
40	SeniorMechTechF	200%	$919.20	$0.00	$0.00	$919.20	32 h	0 h	0 h	0 h	32 h
49	GapN	200%	$0.00	$0.00	$0.00	$0.00	32 h	0 h	0 h	0 h	32 h
50	GapS	200%	$0.00	$0.00	$0.00	$0.00	32 h	0 h	0 h	0 h	32 h
56	Dave Butler	100%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
58	Bill Cooper	100%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
94	Dan Olis	100%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h

Notes

WBS Definition-
This task installs and glues the L0 mounts on the existing SMT bulkheads.

M&S BOE-
NA

Labor BOE-
Detailed consideration of operations involved plus RunIIa experience forms the basis of estimate.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.6.15	**Gaps ready for L0 Insertion**	Tue 11/15/05	Tue 11/15/05	$0.00	$0.00	$0.00	$0.00

Notes

WBS Definition-
Milestone- L0 installed and connected to readout system.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.6.16	**Insert L0 in SMT**	Wed 11/16/05	Fri 11/18/05	$0.00	$0.00	$4,875.20	$4,875.20

Notes

WBS Definition-
This summary task installs L0 in the RunIIa SMT and stores new Be beampipe in ECS.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.6.16.1	Draw L0 into RunIIa SMT, Install Junction Card Mounts	Wed 11/16/05	Thu 11/17/05	$0.00	$0.00	$3,576.40	$3,576.40

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	100%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
39	SeniorMechEngF	350%	$2,657.20	$0.00	$0.00	$2,657.20	56 h	0 h	0 h	0 h	56 h
40	SeniorMechTechF	200%	$919.20	$0.00	$0.00	$919.20	32 h	0 h	0 h	0 h	32 h
49	GapN	200%	$0.00	$0.00	$0.00	$0.00	32 h	0 h	0 h	0 h	32 h
50	GapS	100%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
58	Bill Cooper	100%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
59	Russ Rucinski	50%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
74	Youri Orlov	100%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
93	Mike Roman	100%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
94	Dan Olis	100%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h

Notes

WBS Definition-
This task draws L0 into position, reestablishes purge in NEC beampipe, installs ball mount rings on ends of L0, positions L0 to correct azimuth, tightens ball & cone mounts. It also glues into place the junction card mounts.

M&S BOE-
NA

Labor BOE-
Detailed consideration of operations involved, plus experience with RunIIa silicon installation forms the basis of estimate.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.6.16.2	Move Long tool into ECS, remove L0 Installation Fixtures	Fri 11/18/05	Fri 11/18/05	$0.00	$0.00	$1,298.80	$1,298.80

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
39	SeniorMechEngF	100%	$379.60	$0.00	$0.00	$379.60	8 h	0 h	0 h	0 h	8 h
40	SeniorMechTechF	400%	$919.20	$0.00	$0.00	$919.20	32 h	0 h	0 h	0 h	32 h
49	GapN	200%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
50	GapS	200%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
58	Bill Cooper	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
59	Russ Rucinski	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
74	Youri Orlov	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h

Notes

WBS Definition-
This task moves long L0 installation tool into ECS beampipe, removes installation fixtures, including short installation tool, from gaps.

M&S BOE-
NA

Labor BOE-
Consideration of steps involved forms the basis of estimate for effort.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.6.17	**L0 Mechanical Installation Complete**	Fri 11/18/05	Fri 11/18/05	$0.00	$0.00	$0.00	$0.00

Notes

WBS Definition-
Milestone- Be beampipe installed in L0.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.6.18	**Install Be Beampipe, Junction Cards**	Mon 11/21/05	Wed 11/30/05	$0.00	$0.00	$7,312.80	$7,312.80

Notes

WBS Definition-
This summary task installs the new Be beampipe.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.6.18.1	Install Be Beampipe into L0	Mon 11/21/05	Tue 11/22/05	$0.00	$0.00	$2,437.60	$2,437.60

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	100%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
39	SeniorMechEngF	200%	$1,518.40	$0.00	$0.00	$1,518.40	32 h	0 h	0 h	0 h	32 h
40	SeniorMechTechF	200%	$919.20	$0.00	$0.00	$919.20	32 h	0 h	0 h	0 h	32 h
49	GapN	200%	$0.00	$0.00	$0.00	$0.00	32 h	0 h	0 h	0 h	32 h
50	GapS	200%	$0.00	$0.00	$0.00	$0.00	32 h	0 h	0 h	0 h	32 h
58	Bill Cooper	100%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
59	Russ Rucinski	100%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
74	Youri Orlov	100%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
"Install Be Beampipe into L0" continued							

Notes

WBS Definition-
This task draws the new Be beampipe from the ECS beampipe and locates it in L0. Spool pieces are connected to its ends and capped, and it is evacuated with portable vacuum pump. After leak checking, it is backfilled with GN2.

M&S BOE-
NA

Labor BOE-
RunIIa experience forms the basis of estimate for effort.

1.5.6.18.2	Connect and Leak Test L0 Cooling Manifold & Connections	Wed 11/23/05	Wed 11/23/05	$0.00	$0.00	$1,218.80	$1,218.80

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
39	SeniorMechEngF	200%	$759.20	$0.00	$0.00	$759.20	16 h	0 h	0 h	0 h	16 h
40	SeniorMechTechF	200%	$459.60	$0.00	$0.00	$459.60	16 h	0 h	0 h	0 h	16 h
49	GapN	200%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
50	GapS	200%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
56	Dave Butler	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
58	Bill Cooper	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
59	Russ Rucinski	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
64	Dennis Graham	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
94	Dan Olis	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h

Notes

WBS Definition-
This task connects L0 cooling manifold and leak tests all connections.

M&S BOE-
NA

Labor BOE-
RunIIa experience forms the basis of estimate for effort.

1.5.6.18.3	Install Junction Cards, TempMon Cards, Connect L0	Mon 11/28/05	Wed 11/30/05	$0.00	$0.00	$3,656.40	$3,656.40

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	150%	$0.00	$0.00	$0.00	$0.00	36 h	0 h	0 h	0 h	36 h
39	SeniorMechEngF	200%	$2,277.60	$0.00	$0.00	$2,277.60	48 h	0 h	0 h	0 h	48 h
40	SeniorMechTechF	200%	$1,378.80	$0.00	$0.00	$1,378.80	48 h	0 h	0 h	0 h	48 h
49	GapN	200%	$0.00	$0.00	$0.00	$0.00	48 h	0 h	0 h	0 h	48 h
50	GapS	200%	$0.00	$0.00	$0.00	$0.00	48 h	0 h	0 h	0 h	48 h
55	Linda Bagby	100%	$0.00	$0.00	$0.00	$0.00	24 h	0 h	0 h	0 h	24 h
56	Dave Butler	100%	$0.00	$0.00	$0.00	$0.00	24 h	0 h	0 h	0 h	24 h
58	Bill Cooper	50%	$0.00	$0.00	$0.00	$0.00	12 h	0 h	0 h	0 h	12 h
59	Russ Rucinski	100%	$0.00	$0.00	$0.00	$0.00	24 h	0 h	0 h	0 h	24 h
64	Dennis Graham	100%	$0.00	$0.00	$0.00	$0.00	24 h	0 h	0 h	0 h	24 h
74	Youri Orlov	100%	$0.00	$0.00	$0.00	$0.00	24 h	0 h	0 h	0 h	24 h

Notes

WBS Definition-
This task installs the 12 2-channel junction cards per side. The twisted pair cables on the junction cards connect to the adapter cards on the horseshoes. Six inner junction cards are installed all the way to the adapter cards on the horseshoes, and tested (junction card + twisted pair cable + adapter card), before proceeding with the outer ring of 6 junction cards. The digital cables from L0 are connected to the junction cards as the work proceeds.
The 80-conductor cables and clock cables are reconnected to the adapter cards also.
Connect rad mon and Temp mon cables.

M&S BOE-

Labor BOE-
RunIIa experience forms the basis of estimate for effort. There are 12 2-channel junction cards per side, and four can be installed per day per person. Dave Butler and Denny Graham are the preferred persons, with Linda Bagby; testing is done by Fermilab

1.5.6.19	**RunIIb Be Beampipe Installed, Junction cards Installed**	**Wed 11/30/05**	**Wed 11/30/05**	**$0.00**	**$0.00**	**$0.00**	**$0.00**

Notes

WBS Definition-
Milestone- new Be beampipe installed in L0 and junction cards installed and connected to adapter cards on horseshoes.

1.5.6.20	**Install Inner H-disks**	**Thu 12/1/05**	**Mon 12/5/05**	**$0.00**	**$0.00**	**$3,656.40**	**$3,656.40**
1.5.6.20.1	Install and Cable H-disks, Connect Cooling Lines	Thu 12/1/05	Mon 12/5/05	$0.00	$0.00	$3,656.40	$3,656.40

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	100%	$0.00	$0.00	$0.00	$0.00	24 h	0 h	0 h	0 h	24 h
39	SeniorMechEngF	200%	$2,277.60	$0.00	$0.00	$2,277.60	48 h	0 h	0 h	0 h	48 h
40	SeniorMechTechF	200%	$1,378.80	$0.00	$0.00	$1,378.80	48 h	0 h	0 h	0 h	48 h
49	GapN	100%	$0.00	$0.00	$0.00	$0.00	24 h	0 h	0 h	0 h	24 h
50	GapS	100%	$0.00	$0.00	$0.00	$0.00	24 h	0 h	0 h	0 h	24 h
55	Linda Bagby	100%	$0.00	$0.00	$0.00	$0.00	24 h	0 h	0 h	0 h	24 h

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost

"Install and Cable H-disks, Connect Cooling Lines" continued

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
56	Dave Butler	100%	$0.00	$0.00	$0.00	$0.00	24 h	0 h	0 h	0 h	24 h
64	Dennis Graham	100%	$0.00	$0.00	$0.00	$0.00	24 h	0 h	0 h	0 h	24 h
94	Dan Olis	100%	$0.00	$0.00	$0.00	$0.00	24 h	0 h	0 h	0 h	24 h
95	Joe Howell	100%	$0.00	$0.00	$0.00	$0.00	24 h	0 h	0 h	0 h	24 h

Notes

WBS Definition-
This task installs the H-disk installation fixtures, mounts the H-disks, connects cooling lines and the low mass cables.

M&S BOE-
NA

Labor BOE-
RunIIa experience installing the H-disks forms the basis of estimate.

1.5.6.21	**H-disks Installed**	**Mon 12/5/05**	**Mon 12/5/05**	**$0.00**	**$0.00**	**$0.00**	**$0.00**
1.5.6.22	**Connect Outer Beampipes**	**Tue 12/6/05**	**Thu 12/8/05**	**$0.00**	**$0.00**	**$4,166.20**	**$4,166.20**

Notes

WBS Definition-
This summary task closes the gaps and makes up the outer beampipes.

1.5.6.22.1	Close EC's, EF's, Remove Long L0 Tool from ECS	Tue 12/6/05	Tue 12/6/05	$0.00	$0.00	$1,568.60	$1,568.60

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
39	SeniorMechEngF	50%	$189.80	$0.00	$0.00	$189.80	4 h	0 h	0 h	0 h	4 h
40	SeniorMechTechF	600%	$1,378.80	$0.00	$0.00	$1,378.80	48 h	0 h	0 h	0 h	48 h
49	GapN	200%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
50	GapS	200%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
59	Russ Rucinski	50%	$0.00	$0.00	$0.00	$0.00	4 h	0 h	0 h	0 h	4 h

Notes

WBS Definition-
This task checks clearance between EC beampipes and extension spools, removes gap access hardware, closes EC's, removes long L0 installation tool from ECS, closes EF's, extends shield bridges for use as working platform.

M&S BOE-
NA

Labor BOE-
RunIIa experience involving manipulation of EC's and EF's and scaffolds, forms the basis of estimate.

1.5.6.22.2	Install SNEG pipes	Wed 12/7/05	Thu 12/8/05	$0.00	$0.00	$2,597.60	$2,597.60

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
39	SeniorMechEngF	100%	$759.20	$0.00	$0.00	$759.20	16 h	0 h	0 h	0 h	16 h
40	SeniorMechTechF	400%	$1,838.40	$0.00	$0.00	$1,838.40	64 h	0 h	0 h	0 h	64 h
59	Russ Rucinski	100%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h

Notes

WBS Definition-
This task opens the EC beampipes, installs SNEG pipes, installs remote valve and purge on quad cross. Measures and adjusts location of EC beampipe flange with respect to quad. Bags (with remote supply) the SNEG-EC beampipe joints for leak checking. Bags (with remote supply) the quad cross for later leak checking.

M&S BOE-
NA

Labor BOE-
Experience during 2004 shutdown forms the basis of estimate.

1.5.6.23	**Outer Beampipes Connected**	**Thu 12/8/05**	**Thu 12/8/05**	**$0.00**	**$0.00**	**$0.00**	**$0.00**

Notes

WBS Definition-
Milestone- Outer beampipes connected.

1.5.6.24	**Open Gaps, Make Up Inner Beampipes, Leakcheck, Install**	**Fri 12/9/05**	**Fri 12/16/05**	**$0.00**	**$0.00**	**$6,224.20**	**$6,224.20**

Notes

WBS Definition-
This summary task opens the gaps makes up the the inner beampipes.

1.5.6.24.1	Open EC's, Install gap access hardware	Fri 12/9/05	Fri 12/9/05	$0.00	$0.00	$1,568.60	$1,568.60

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
39	SeniorMechEngF	50%	$189.80	$0.00	$0.00	$189.80	4 h	0 h	0 h	0 h	4 h
40	SeniorMechTechF	600%	$1,378.80	$0.00	$0.00	$1,378.80	48 h	0 h	0 h	0 h	48 h

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
"Open EC's, Install gap access hardware" continued							

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
49	GapN	200%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
50	GapS	200%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
59	Russ Rucinski	50%	$0.00	$0.00	$0.00	$0.00	4 h	0 h	0 h	0 h	4 h

Notes

WBS Definition-
This task retracts the muon bridges, opens the EF's, the EC's, installs the gap access hardware,

M&S BOE-
NA

Labor BOE-
RunIIa experience manipulation EC's and scaffolding forms the basis of estimate for effort.

1.5.6.24.2	Weld EC bellows, Make spool/EC joint, Leakcheck	Mon 12/12/05	Tue 12/13/05	$0.00	$0.00	$1,908.20	$1,908.20

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	50%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
39	SeniorMechEngF	100%	$759.20	$0.00	$0.00	$759.20	16 h	0 h	0 h	0 h	16 h
40	SeniorMechTechF	200%	$919.20	$0.00	$0.00	$919.20	32 h	0 h	0 h	0 h	32 h
42	WelderF	50%	$229.80	$0.00	$0.00	$229.80	8 h	0 h	0 h	0 h	8 h
49	GapN	200%	$0.00	$0.00	$0.00	$0.00	32 h	0 h	0 h	0 h	32 h
50	GapS	200%	$0.00	$0.00	$0.00	$0.00	32 h	0 h	0 h	0 h	32 h
58	Bill Cooper	50%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h
59	Russ Rucinski	100%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h

Notes

WBS Definition-
This task welds new extensions/flanges to the EC beampipes, makes up connections betwee new flanges and extensions bellows, removes the supports of the extensions, evacuates D0 beampipe via remote valve at S quad, helium-leak checks D0 beampipe. A leak detected at joint in outer pipe region would necessitate closing that EC/EF.

M&S BOE-
NA

Labor BOE-
2004 shudown experience forms the basis of estimate for effort.

1.5.6.24.3	Install Beampipe supports	Wed 12/14/05	Wed 12/14/05	$0.00	$0.00	$1,069.00	$1,069.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
39	SeniorMechEngF	100%	$379.60	$0.00	$0.00	$379.60	8 h	0 h	0 h	0 h	8 h
40	SeniorMechTechF	300%	$689.40	$0.00	$0.00	$689.40	24 h	0 h	0 h	0 h	24 h
49	GapN	200%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
50	GapS	200%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
59	Russ Rucinski	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h

Notes

WBS Definition-
This task installs the beampipe supports.

M&S BOE-
NA

Labor BOE-
RunIIa experience forms the basis of estimate for effort.

1.5.6.24.4	Install H-disk insulation & Tedlar Membrane, Cool Silicon	Thu 12/15/05	Fri 12/16/05	$0.00	$0.00	$1,678.40	$1,678.40

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	100%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
39	SeniorMechEngF	100%	$759.20	$0.00	$0.00	$759.20	16 h	0 h	0 h	0 h	16 h
40	SeniorMechTechF	200%	$919.20	$0.00	$0.00	$919.20	32 h	0 h	0 h	0 h	32 h
49	GapN	200%	$0.00	$0.00	$0.00	$0.00	32 h	0 h	0 h	0 h	32 h
50	GapS	200%	$0.00	$0.00	$0.00	$0.00	32 h	0 h	0 h	0 h	32 h
56	Dave Butler	100%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
58	Bill Cooper	100%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
59	Russ Rucinski	100%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
64	Dennis Graham	100%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h

Notes

WBS Definition-
This task installs TLD rad monitors, H-disk foam insulation and Tedlar cover over tracker region. Then it cools down the silicon.

M&S BOE-
NA

Labor BOE-
RunIIa and 2004 shudown experience forms the basis of estimate for effort.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.6.25	**Silicon Cold and Ready for Technical Commissioning**	Fri 12/16/05	Fri 12/16/05	$0.00	$0.00	$0.00	$0.00

Notes

WBS Definition-
Milestone- RunIIb silicon cooled and ready for technical commissioning.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.6.26	**Technical commissioning of RunIIb Silicon**	Mon 12/19/05	Tue 12/27/05	$0.00	$0.00	$0.00	$0.00
1.5.6.26.1	Demonstrate Full Operability of all Channels from Control Roc	Mon 12/19/05	Tue 12/27/05	$0.00	$0.00	$0.00	$0.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
12	PhysicistU	400%	$0.00	$0.00	$0.00	$0.00	160 h	0 h	0 h	0 h	160 h

Notes

WBS Definition-
All of the electrical connections for the silicon are checked in this task. Testing proceeds on a quadrant-by-quadrant basis.

M&S BOE-
NA

Labor BOE-
Run2a experience forms the basis of the estimates for labor. Two shifts per day assumed.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.6.26.2	Demonstrate Full Operability of all Channels from Control Roc	Mon 12/19/05	Tue 12/27/05	$0.00	$0.00	$0.00	$0.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	400%	$0.00	$0.00	$0.00	$0.00	160 h	0 h	0 h	0 h	160 h

Notes

WBS Definition-
All of the electrical connections for the silicon are checked in this task. Testing proceeds on a quadrant-by-quadrant basis.

M&S BOE-
NA

Labor BOE-
Run2a experience forms the basis of the estimates for labor. Two shifts per day assumed.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.6.27	**Close Gaps, Restore Detector to Operation**	Wed 12/28/05	Mon 1/9/06	$0.00	$0.00	$10,470.40	$10,470.40
1.5.6.27.1	Close EC's	Wed 12/28/05	Wed 12/28/05	$0.00	$0.00	$1,758.40	$1,758.40

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
39	SeniorMechEngF	100%	$379.60	$0.00	$0.00	$379.60	8 h	0 h	0 h	0 h	8 h
40	SeniorMechTechF	600%	$1,378.80	$0.00	$0.00	$1,378.80	48 h	0 h	0 h	0 h	48 h
49	GapN	200%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
50	GapS	200%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
59	Russ Rucinski	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h

Notes

WBS Definition-
This task removes gap access hardware and closes EC's.

M&S BOE-
NA

Labor BOE-
RunIIa experience involving manipulation of EC's forms the basis of estimate.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.6.27.2	Make Final Leak Check of EC/SNEG joint, Install BLM's	Thu 12/29/05	Thu 12/29/05	$0.00	$0.00	$689.40	$689.40

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
40	SeniorMechTechF	300%	$689.40	$0.00	$0.00	$689.40	24 h	0 h	0 h	0 h	24 h
49	GapN	200%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
50	GapS	200%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h

Notes

WBS Definition-
This task makes a final leak check of EC/SNEG joints, removes leak checking bags, installs BLM's.

M&S BOE-
NA

Labor BOE-
RunIIa and 2004 shudown experience forms the basis of estimate for effort.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.6.27.3	Survey Closed EC's	Tue 1/3/06	Tue 1/3/06	$0.00	$0.00	$0.00	$0.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
54	Surveyors	200%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h

Notes

WBS Definition-

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
"Survey Closed EC's" continued							

Notes

This task makes VSTAR survey of closed EC's

M&S BOE-
NA

Labor BOE-
RunIIa experience forms the basis of estimate.

1.5.6.27.4	Close EF's, make final local leak check of SNEG/bellows/cross	Wed 1/4/06	Wed 1/4/06	$0.00	$0.00	$1,758.40	$1,758.40

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
39	SeniorMechEngF	100%	$379.60	$0.00	$0.00	$379.60	8 h	0 h	0 h	0 h	8 h
40	SeniorMechTechF	600%	$1,378.80	$0.00	$0.00	$1,378.80	48 h	0 h	0 h	0 h	48 h
59	Russ Rucinski	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h

Notes

WBS Definition-
This task closes the EF's , makes a final leak check of SNEG/Cross joints, removes leak checking bags, installs SNEG heat tapes.

M&S BOE-
NA

Labor BOE-
RunIIa and 2004 shudown experience forms the basis of estimate for effort.

1.5.6.27.5	Activate SNEG's	Thu 1/5/06	Fri 1/6/06	$0.00	$0.00	$1,678.40	$1,678.40

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
39	SeniorMechEngF	100%	$759.20	$0.00	$0.00	$759.20	16 h	0 h	0 h	0 h	16 h
40	SeniorMechTechF	200%	$919.20	$0.00	$0.00	$919.20	32 h	0 h	0 h	0 h	32 h
59	Russ Rucinski	100%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h

Notes

WBS Definition-
This task bakes out the SNEG pipes (48 hours).

M&S BOE-
NA

Labor BOE-
2004 shudown experience forms the basis of estimate for effort.

1.5.6.27.6	Close CF's, Extend Muon Shields,Test Magnet Power Supplie	Thu 1/5/06	Thu 1/5/06	$0.00	$0.00	$1,988.20	$1,988.20

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
39	SeniorMechEngF	100%	$379.60	$0.00	$0.00	$379.60	8 h	0 h	0 h	0 h	8 h
40	SeniorMechTechF	400%	$919.20	$0.00	$0.00	$919.20	32 h	0 h	0 h	0 h	32 h
41	SurveyorF	300%	$689.40	$0.00	$0.00	$689.40	24 h	0 h	0 h	0 h	24 h
59	Russ Rucinski	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h

Notes

WBS Definition-
This task closes the CF yokes, extends the muon shields if required, exercises magnet power supplies.

M&S BOE-
NA

Labor BOE-
RunIIa experience forms the basis of estimate for effort.

1.5.6.27.7	Make Stickmike survey	Fri 1/6/06	Fri 1/6/06	$0.00	$0.00	$0.00	$0.00

Notes

WBS Definition-
This task makes stickmike survey of CF's, EF's.

M&S BOE-
NA

Labor BOE-
RunIIa experience forms the basis of estimate for effort.

1.5.6.27.8	Retract Muon Shields	Fri 1/6/06	Fri 1/6/06	$0.00	$0.00	$1,298.80	$1,298.80

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
39	SeniorMechEngF	100%	$379.60	$0.00	$0.00	$379.60	8 h	0 h	0 h	0 h	8 h

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
"Retract Muon Shields" continued							

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
40	SeniorMechTechF	400%	$919.20	$0.00	$0.00	$919.20	32 h	0 h	0 h	0 h	32 h
59	Russ Rucinski	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h

Notes

WBS Definition-
This task opens the forward muon shielding.

M&S BOE-
NA

Labor BOE-
RunIIa and 2004 shudown experience forms the basis of estimate for effort.

1.5.6.27.9	Install FPD Veto Counters on SNEG pipes, Extend Muon Shie	Mon 1/9/06	Mon 1/9/06	$0.00	$0.00	$1,298.80	$1,298.80

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
39	SeniorMechEngF	100%	$379.60	$0.00	$0.00	$379.60	8 h	0 h	0 h	0 h	8 h
40	SeniorMechTechF	400%	$919.20	$0.00	$0.00	$919.20	32 h	0 h	0 h	0 h	32 h
59	Russ Rucinski	100%	$0.00	$0.00	$0.00	$0.00	8 h	0 h	0 h	0 h	8 h

Notes

WBS Definition-
This task installs the FPD veto counters, extends the forward muon shielding. The detector is ready for resumption of the Tevatron.

M&S BOE-
NA

Labor BOE-
RunIIa and 2004 shudown experience forms the basis of estimate for effort.

1.5.6.28	**Detector Closed for Resumption of Tevatron**	**Mon 1/9/06**	**Mon 1/9/06**	**$0.00**	**$0.00**	**$0.00**	**$0.00**

Notes

WBS Definition-
Milestone- RunIIb detector closed and ready for physics.

1.5.6.29	**Commission Silicon Online Readout Software**	**Wed 12/28/05**	**Thu 1/12/06**	**$0.00**	**$0.00**	**$0.00**	**$0.00**

Notes

WBS Definition-
This task provides for the testing of the Online Readout Software, which includesthe unpacking software which facilitates the data transfer from electronic coordinates to physics coordinates, and the unpacking software for L3 and offline analysis. The majority of this software is taken from Run IIa and modified for use at SiDet for the 1% and 10% silicon test stands, prior to the start of the Run IIb shutdown.
The elapsed times for the tasks assume immediate access to the detector to resolve mapping, etc. If the Tevatron has resumed operations, the task durations dialate.

1.5.6.29.1	Verify functionality of all SMT software - Univ	Wed 12/28/05	Thu 1/12/06	$0.00	$0.00	$0.00	$0.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
12	PhysicistU	400%	$0.00	$0.00	$0.00	$0.00	320 h	0 h	0 h	0 h	320 h

Notes

WBS Definition-
This task verifies the functionality of the monitoring and downloading software of all silicon crates,
data unpacking software (electronics to physics addressing), L3/offline software (Examine).

M&S BOE-
NA

Labor BOE-
This effort is primarily based on verifying the proper function of well-understood modifications made to the Run IIa software.

1.5.6.29.2	Verify functionality of all SMT software - FNAL	Wed 12/28/05	Thu 1/12/06	$0.00	$0.00	$0.00	$0.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	400%	$0.00	$0.00	$0.00	$0.00	320 h	0 h	0 h	0 h	320 h

Notes

WBS Definition-
This task verifies the functionality of the monitoring and downloading software of all silicon crates,
data unpacking software (electronics to physics addressing), L3/offline software (Examine).

M&S BOE-
NA

Labor BOE-
This effort is primarily based on verifying the proper function of well-understood modifications made to the Run IIa software.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.7	**Silicon System Ready for Physics Commissioning**	Thu 1/12/06	Thu 1/12/06	$0.00	$0.00	$0.00	$0.00

Notes

WBS Definition-
Milestone-The RunIIb silicon system has been installed, technically commisioned, and is ready for physics commissioning.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.8	**Run IIb Trigger Installation & Technical Commissioning**	Mon 1/5/04	Fri 2/10/06	$145,500.00	$0.00	$377,957.60	$523,457.60

Notes

WBS Definition-
The Run IIb trigger upgrade includes upgrades to three systems - the Level 1 calorimeter trigger, a calorimeter cluster track match at Level 1, and the Level 1 central track trigger, as well as upgrades to the Level 2 beta processors and the Level 2 Silicon Track Trigger. This summary WBS element includes the effort required to install and initially commission these trigger upgrades.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.8.1	**Prepare Infrastructure at DAB**	Mon 1/5/04	Wed 11/9/05	$70,000.00	$0.00	$152,521.60	$222,521.60

Notes

WBS Definition-
This summary task includes activities that must take place to ensure that all infrastructure components required for the Run IIb trigger (Cal L1 racks, Cal BLS cables, L1 Cal/Track Match crates, boards, and cables) are in hand prior to shutdown.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.8.1.1	Prepare new L1 Cal Racks	Mon 1/5/04	Mon 12/13/04	$35,000.00	$0.00	$74,064.00	$109,064.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
37	SeniorElecEngF	50%	$45,264.00	$0.00	$45,264.00	$0.00	960 h	0 h	0 h	960 h	0 h
38	SeniorElecTechF	50%	$28,800.00	$0.00	$28,800.00	$0.00	960 h	0 h	0 h	960 h	0 h
48	MandS	35,000	$35,000.00	$0.00	$35,000.00	$0.00	35,000		0	35,000	0
72	John Anderson	25%	$0.00	$0.00	$0.00	$0.00	480 h	0 h	0 h	480 h	0 h
76	Tom Regan	25%	$0.00	$0.00	$0.00	$0.00	480 h	0 h	0 h	480 h	0 h

Notes

WBS Definition-
This involves outfitting 4 new L1 Cal racks with water cooling, air blowers, safety systems, power supplies, voltage monitoring, monitoring and alarm software, AC and DC power. In addition, four racks with no cooling must be provided. This work must be done before the racks are required in the test area in DAB1.

M&S BOE-
Protected & cooled racks and equipment to be installed as described above: $7500 per rack, R.Hance 3/12/2002 estimate. Passive racks $500 each (Fermilab stock item).

Labor BOE-
Detailed estimate by D. Edmunds of labor involved (see supporting documents). Assumes 6 months of preparatory work by an electrical engineer and a physicist + 1 week of cabling, testing, etc. per rack for a technician, and part-time oversight by an electrical engineer.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.8.1.2	Preliminary Commissioning of Cal Trig Elements - UIC	Wed 3/9/05	Fri 7/15/05	$0.00	$0.00	$0.00	$0.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
12	PhysicistU	200%	$0.00	$0.00	$0.00	$0.00	1,440 h	0 h	0 h	0 h	1,440 h

Notes

WBS Definition-
This task provides for the installation of Cal Trig components (ADFs, TABs and GABs and inter-card cabling as they become available from the Upgrade Project) and ultimately the entire Cal Trig system for testing, and for development and debugging of control software, in the DAB1 area before the shutdown. The upgrade project and RunIIa will provide data collection software (SDAQ), downloading and controls, and online monitoring tools (EPICS) for use by this task.

M&S BOE-
NA

Labor BOE-
Two university physicists working full time are required for this task. Task duration extends until last hardware component of L1 Cal Trig is installed at the sidewalk test area.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.8.1.3	Preliminary Commissioning of Cal Trig Elements - FNAL	Wed 3/9/05	Fri 7/15/05	$0.00	$0.00	$0.00	$0.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	200%	$0.00	$0.00	$0.00	$0.00	1,440 h	0 h	0 h	0 h	1,440 h

Notes

WBS Definition-
This task provides for the installation of Cal Trig components (ADFs, TABs and GABs and inter-card cabling as they become available from the Upgrade Project) and ultimately the entire Cal Trig system for testing, and for development and debugging of control software, in the DAB1 area before the shutdown. The upgrade project and RunIIa will provide data collection software (SDAQ), downloading and controls, and online monitoring tools (EPICS) for use by this task.

M&S BOE-
NA

Labor BOE-
Two university physicists working full time are required for this task. Task duration extends until last hardware component of L1 Cal Trig is installed at the sidewalk test area.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.8.1.4	Develop L1 Cal Commissioning Software-Upgrade	Wed 12/1/04	Fri 2/4/05	$0.00	$0.00	$0.00	$0.00

Notes

WBS Definition-Task provides for the creation and installation of L1Cal software:

M&S BOE- NA

Labor BOE-None. Task is managed by Upgrade Project. Estimated 2 FTE physicists required starting fall 2004.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.8.1.5	Provide for BLS cable re-routing: UIC	Wed 5/26/04	Fri 1/21/05	$0.00	$0.00	$0.00	$0.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
12	PhysicistU	50%	$0.00	$0.00	$0.00	$0.00	640 h	0 h	0 h	640 h	0 h
46	SeniorMechEngU	10%	$0.00	$0.00	$0.00	$0.00	128 h	0 h	0 h	128 h	0 h
75	Alan Stone	50%	$0.00	$0.00	$0.00	$0.00	640 h	0 h	0 h	640 h	0 h
77	Dan Edmunds	10%	$0.00	$0.00	$0.00	$0.00	128 h	0 h	0 h	128 h	0 h

Notes

WBS Definition-
Plan routing of BLS cables to ADF. This will involve verifying that the plan is feasible in the Dzero Moving Counting House. This item represents the UIC part of the effort.
Preliminary scheme involves creation of patch panels with paddle boards and short cables to allow existing BLS cables (1280) to be routed to new ADF (40) via cables (160 "pleated foil" cables), paddle cards (80 cards, 2 pleated foil inputs each, connects to ADF) and patch panels (80 panels, 16 BLS input, 2 pleated foil outputs)

M&S BOE-
$35,000 for patch panels, paddle cards, pleated foil cables to ADF (J. Green detailed estimate 7/04).

Labor BOE-
Advising by MSU engineer as needed, ongoing effort of Johnny Green (FNAL), physicist (Alan Stone)

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.8.1.6	Provide for BLS cable re-routing: FNAL	Wed 5/26/04	Fri 1/21/05	$35,000.00	$0.00	$60,352.00	$95,352.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
37	SeniorElecEngF	100%	$60,352.00	$0.00	$60,352.00	$0.00	1,280 h	0 h	0 h	1,280 h	0 h
48	MandS	35,000	$35,000.00	$0.00	$35,000.00	$0.00	35,000		0	35,000	0
85	Johnny Green	100%	$0.00	$0.00	$0.00	$0.00	1,280 h	0 h	0 h	1,280 h	0 h

Notes

WBS Definition-
Plan routing of BLS cables to ADF. This will involve verifying that the plan is feasible in the Dzero Moving Counting House. This item represents the UIC part of the effort.
Preliminary scheme involves creation of patch panels with paddle boards and short cables to allow existing BLS cables (1280) to be routed to new ADF (40) via cables (160 "pleated foil" cables), paddle cards (80 cards, 2 pleated foil inputs each, connects to ADF) and patch panels (80 panels, 16 BLS input, 2 pleated foil outputs)

M&S BOE-
$35,000 for patch panels, paddle cards, pleated foil cables to ADF (J. Green detailed estimate 7/04).

Labor BOE-
Advising by MSU engineer as needed, ongoing effort of Johnny Green (FNAL), physicist (Alan Stone)

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.8.1.7	Make Muon PDT and SFE Mods for CTM	Fri 1/7/05	Fri 3/4/05	$0.00	$0.00	$15,088.00	$15,088.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	10%	$0.00	$0.00	$0.00	$0.00	32 h	0 h	0 h	8 h	24 h
37	SeniorElecEngF	100%	$15,088.00	$0.00	$3,772.00	$11,316.00	320 h	0 h	0 h	80 h	240 h
86	Sten Hansen	100%	$0.00	$0.00	$0.00	$0.00	320 h	0 h	0 h	80 h	240 h
87	Tom Fitzpatrick	50%	$0.00	$0.00	$0.00	$0.00	160 h	0 h	0 h	40 h	120 h
92	Al Ito	10%	$0.00	$0.00	$0.00	$0.00	32 h	0 h	0 h	8 h	24 h

Notes

WBS Definition-
Develop and demonstrate modification of muon PDT frontends for pipeline extension, and firmware for Scintillator front ends.

M&S BOE -
NA

Labor BOE - Run2a muon Level 1 experience with PDT board maintenance & development. Sten Hansen develops PDT board change at "mini", Al Ito proves R&D board (s) performance in detector. Tom Fitzpatrick develops Scintillator Firmware.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.8.1.8	Develop Trigsim Software-U	Wed 11/24/04	Tue 3/29/05	$0.00	$0.00	$0.00	$0.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
12	PhysicistU	150%	$0.00	$0.00	$0.00	$0.00	960 h	0 h	0 h	816 h	144 h

Notes

WBS Definition-
Develop L2STT, Ratetool, Trigsimcert software.

M&S BOE-

Labor BOE- Effort not provided by Upgrade. Three physicists working full time for 16 weeks (~ 1 man-year).

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.8.1.9	Develop Trigsim Software-FNAL	Wed 11/24/04	Tue 3/29/05	$0.00	$0.00	$0.00	$0.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	150%	$0.00	$0.00	$0.00	$0.00	960 h	0 h	0 h	816 h	144 h

Notes

WBS Definition-
Develop L2STT, Ratetool, Trigsimcert software.

M&S BOE-

Labor BOE- Three physicists working full time for 16 weeks (~ 1 man-year), not provided by Upgrade. Share with U as soon as specified.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
"Develop Trigsim Software-FNAL" continued							

Notes

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.8.1.10	Develop CTM Operating Software-Arizona	Wed 3/2/05	Thu 7/21/05	$0.00	$0.00	$0.00	$0.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
12	PhysicistU	100%	$0.00	$0.00	$0.00	$0.00	800 h	0 h	0 h	0 h	800 h

Notes

WBS Definition-
Develop software required to operate CTM: modify Vxworks (processor, L1CTM flavor,..); add L1CTM to cold-start GUI, to input GUI, to parity-check GUI, to mtm-term GUI, power supply GUI, RM/RMI GUI, comics notebook GUI; develop Quicktest/quickcheck script; COOR trigger terms download; add L1CTM to online simulator-hardware comparison code, to online efficiency code; generate first-pass trigger logic (e.g. BOT, L1CTT-only, L1Cal-only, L1CTT and L1Cal for electrons, taus, jets); online web pages and documentation;
Develop offline software: read L1CTM from RDS, TMB; tsim_L1caltrack; L1caltrack_analyze(unpacker); L1L2_evt (into TMB); examine; documentation

M&S BOE- NA

Labor BOE- two physicists working full time. Effort not managed by Upgrade Project.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.8.1.11	Develop CTM Operating Software-FNAL	Wed 3/2/05	Thu 7/21/05	$0.00	$0.00	$0.00	$0.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	100%	$0.00	$0.00	$0.00	$0.00	800 h	0 h	0 h	0 h	800 h

Notes

WBS Definition-
Develop software required to operate CTM: modify Vxworks (processor, L1CTM flavor,..); add L1CTM to cold-start GUI, to input GUI, to parity-check GUI, to mtm-term GUI, power supply GUI, RM/RMI GUI, comics notebook GUI; develop Quicktest/quickcheck script; COOR trigger terms download; add L1CTM to online simulator-hardware comparison code, to online efficiency code; generate first-pass trigger logic (e.g. BOT, L1CTT-only, L1Cal-only, L1CTT and L1Cal for electrons, taus, jets); online web pages and documentation;
Develop offline software: read L1CTM from RDS, TMB; tsim_L1caltrack; L1caltrack_analyze(unpacker); L1L2_evt (into TMB); examine; documentation

M&S BOE- NA

Labor BOE- two physicists working full time. Effort not managed by Upgrade Project. Share with U as soon as U specified.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.8.1.12	Develop CTT Operating Software-Upgrade	Wed 1/19/05	Wed 6/8/05	$0.00	$0.00	$0.00	$0.00

Notes

WBS Definition-
Develop software required to operate CTT: DFE PS control for DFEB crates; raw ethernet driver; raw ethernet serializer; add DFEB + extra CTOC boards to dfe_ware database; add download interface for DFEB to dfe_ware; update link test scripts + firmware for Mixer-DFEB-CTOC connection test; create DFEB firmware for Mixer-DFEB-CTOC link test; update trigsim both for new and old equations; add DFEB+new CTOC to CTT_Examine; add DFEB +new CTOC to offline verification programs;

M&S BOE- NA

Labor BOE-None. All effort provided by Upgrade Project

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.8.1.13	Preliminary Commissioning of L1 CTT elements-Upgrade	Wed 1/19/05	Wed 6/8/05	$0.00	$0.00	$0.00	$0.00

Notes

WBS Definition-
This task provides for the precommissioning of DFEB's (new DFEA backplane and crate controller also) as they become available. All operating software -- PS control for DFEB crates, raw ethernet driver, raw ethernet serializer, DFEB boards added to dfe_ware database, download interface for DFEB to dfe_ware,...is verified during these tests.

M&S BOE-
NA

Labor BOE- None. All effort provided by Upgrade Project.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.8.1.14	Preliminary Commissioning of L1 CTM elements-Arizona	Tue 6/21/05	Wed 11/9/05	$0.00	$0.00	$0.00	$0.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
12	PhysicistU	50%	$0.00	$0.00	$0.00	$0.00	400 h	0 h	0 h	0 h	400 h

Notes

WBS Definition-
This task provides for the installation of L1MU trigger and crate manager cards in new L1 CTM crate installed in MCH1, begin the technical commissioning of L1 CTM (BOT triggers to TFW, etc.) then replace with production L1 CTM trigger and crate manager cards as they become available.

M&S BOE-
NA

Labor BOE-
Two university physicists working half time are required for this task. Task duration extends until last hardware component of L1 CTM is installed in MCH1.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.8.1.15	Preliminary Commissioning of L1 CTM elements-FNAL	Tue 6/21/05	Wed 11/9/05	$0.00	$0.00	$0.00	$0.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	50%	$0.00	$0.00	$0.00	$0.00	400 h	0 h	0 h	0 h	400 h

Notes

WBS Definition-
This task provides for the installation of L1MU trigger and crate manager cards in new L1 CTM crate installed in MCH1, begin the technical commissioning of L1 CTM (BOT triggers to TFW, etc.) then replace with production L1 CTM trigger and crate manager cards as they become available.

M&S BOE-
NA

Labor BOE-
Two university physicists working half time are required for this task. Task duration extends until last hardware component of L1 CTM is installed in MCH1.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.8.1.16	**Prepare Safety and PORC documentation**	**Mon 8/23/04**	**Mon 6/20/05**	**$0.00**	**$0.00**	**$3,017.60**	**$3,017.60**

Notes

WBS Definition-
This summary task prepares necessary PORCs ("Partial Operational Readiness Clearance") safety documentation for unattended operation of new hardware for trigger upgrade.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.8.1.16.1	Prepare L1CTT DFEB PORC Documentation	Mon 8/23/04	Fri 8/27/04	$0.00	$0.00	$1,131.60	$1,131.60

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
37	SeniorElecEngF	60%	$1,131.60	$0.00	$1,131.60	$0.00	24 h	0 h	0 h	24 h	0 h
72	John Anderson	10%	$0.00	$0.00	$0.00	$0.00	4 h	0 h	0 h	4 h	0 h
79	Jamieson Olson	50%	$0.00	$0.00	$0.00	$0.00	20 h	0 h	0 h	20 h	0 h

Notes

WBS Definition-
This task provides effort for the preparation of the safety documentation and PORC, including "walk-thrus" required for permission to operate the system, for the DFE crates and power supplies installed on the platform.

M&S BOS-
None.

Labor BOE-
Based on RunIIa experience and considering that review/updating of existing documentation constitutes the bulk of the task, one week time by an electrical engineer, and physicist are required for this task. Jamieson Olson is the preferred engineer.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.8.1.16.2	Prepare PORC for L1CTM Crates - FNAL	Tue 6/7/05	Mon 6/20/05	$0.00	$0.00	$1,886.00	$1,886.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
37	SeniorElecEngF	50%	$1,886.00	$0.00	$0.00	$1,886.00	40 h	0 h	0 h	0 h	40 h
72	John Anderson	50%	$0.00	$0.00	$0.00	$0.00	40 h	0 h	0 h	0 h	40 h

Notes

WBS Definition-
This task provides effort for the preparation of the safety documentation and PORC, including "walk-thrus" required for permission to operate the system, for the L1CTM crates in MCH1. The primary emphasis of the pORC is that of the boards; the crate and installation are not novel.

M&S BOS-
None.

Labor BOE-
Based on RunIIa experience and considering that review/updating of existing documentation constitutes the bulk of the task, one week time by an electrical engineer, and physicist are required for this task. Jeff Temple and John Anderson are the preferred personnel.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.8.1.16.3	Prepare PORC for L1CTM Crates - UAZ	Tue 6/7/05	Mon 6/20/05	$0.00	$0.00	$0.00	$0.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
12	PhysicistU	50%	$0.00	$0.00	$0.00	$0.00	40 h	0 h	0 h	0 h	40 h
84	Jeff Temple	50%	$0.00	$0.00	$0.00	$0.00	40 h	0 h	0 h	0 h	40 h

Notes

WBS Definition-
This task provides effort for the preparation of the safety documentation and PORC, including "walk-thrus" required for permission to operate the system, for the L1CTM crates in MCH1. The primary emphasis of the pORC is that of the boards; the crate and installation are not novel.

M&S BOS-
None.

Labor BOE-
Based on RunIIa experience and considering that review/updating of existing documentation constitutes the bulk of the task, one week time by an electrical engineer, and physicist are required for this task. Jeff Temple and John Anderson are the preferred personnel.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.8.1.17	**Trigger Safety and PORC Documentation Completed**	**Mon 6/20/05**	**Mon 6/20/05**	**$0.00**	**$0.00**	**$0.00**	**$0.00**

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.8.2	**Trigger Infrastructure Prepared**	**Fri 7/15/05**	**Fri 7/15/05**	**$0.00**	**$0.00**	**$0.00**	**$0.00**

Notes
WBS Definition-
Milestone- Trigger Infrastructure tasks completed. Included are: completion of L1 Cal Trigger racks for MCH1; preliminary commissioning of all Cal Trig elements in test stand on the DAB1 sidewalk; the planning for the rerouting of the Cal BLS cables in MCH1; the iinstallation of the Cal-Trk VME crate and the Cal Track Match Crate and power supplies in MCH1; the CalTrackMatch splitter crate, rack, and rack services,on the platform; and install the MTCxx and MTCM electronics in the crate;

1.5.8.3	AFEII Stuff	Wed 12/1/04	Thu 1/6/05	$0.00	$0.00	$0.00	$0.00
1.5.8.4	Detector Repair and Maintenance	Mon 10/3/05	Tue 11/29/05	$0.00	$0.00	$0.00	$0.00
1.5.8.5	Cal Maintenance	Mon 10/3/05	Tue 11/29/05	$0.00	$0.00	$0.00	$0.00

Notes
12 sector preamp power supply harness repair and maintenance
needs to begin when L1cal installation done

1.5.8.6	**Level 1 Calorimeter Trigger**	**Fri 7/15/05**	**Wed 1/4/06**	**$73,000.00**	**$0.00**	**$160,825.50**	**$233,825.50**

Notes
WBS Definition-
This summary element covers the Level 1 calorimeter trigger modifications. It includes development and procurement of ADC/digital filter boards (ADF), development and procurement of trigger-algorithm boards (TAB), the provision of output signals to facilitate a match between calorimeter towers and tracks, and procurement and improvements in associated readout crates, power supplies, cabling, and controls hardware.

1.5.8.6.1	**L1 Cal Trigger Production And Testing Complete**	**Fri 7/15/05**	**Fri 7/15/05**	**$0.00**	**$0.00**	**$0.00**	**$0.00**

Notes
WBS Definition-
Milestone- All L1 Cal components produced or procured. Full functionality of custom boards (ADF, TAB, GAB) bench tested at institutes where they were developed. Tests consist of using simulated inputs to verify that all the outputs of the board are as expected and that bit error rates are acceptable - corresponding to approximately 1 fatal error per day at nominal data volumes. Milestone is achieved when the number of boards required in the system (80 ADFs, 8 TABs and 1 GAB) have passed the bench tests above. Included in milestone are the preparation of the pleated cables and patch panels required for the BLS-ADF interconnection.

1.5.8.6.2	**L1 Cal Installation And Technical Commissioning**	**Fri 7/15/05**	**Wed 1/4/06**	**$73,000.00**	**$0.00**	**$160,825.50**	**$233,825.50**

Notes
WBS Definition-
This summary task describes the installation of the new calorimeter trigger in the DZero moveable counting house.

1.5.8.6.2.1	Engineering and Computer Professional Support - FNAL	Fri 7/15/05	Tue 12/20/05	$0.00	$0.00	$108,372.00	$108,372.00

ID	*Resource Name*	*Units*	*Cost*	*Baseline Cost*	*Act. Cost*	*Rem. Cost*	*Work*	*Ovt. Work*	*Baseline Work*	*Act. Work*	*Rem. Work*
13	*CompProfF*	*200%*	*$66,880.00*	*$0.00*	*$0.00*	*$66,880.00*	*1,760 h*	*0 h*	*0 h*	*0 h*	*1,760 h*
37	*SeniorElecEngF*	*100%*	*$41,492.00*	*$0.00*	*$0.00*	*$41,492.00*	*880 h*	*0 h*	*0 h*	*0 h*	*880 h*

Notes
WBS Definition-
This task provides for the support of two computing professionals and one electrical engineer full time for oversight, consultation and testing/monitoring software tasks during trigger installation effort.

M&S BOE-
NA

Labor BOE-
Run IIa experience forms the basis of this estimate. Jamieson Olson is the preferred electrical engineer.

1.5.8.6.2.2	Engineering Support - MSU	Fri 7/15/05	Tue 12/20/05	$72,000.00	$0.00	$0.00	$72,000.00

ID	*Resource Name*	*Units*	*Cost*	*Baseline Cost*	*Act. Cost*	*Rem. Cost*	*Work*	*Ovt. Work*	*Baseline Work*	*Act. Work*	*Rem. Work*
44	*SeniorElecEngU*	*200%*	*$0.00*	*$0.00*	*$0.00*	*$0.00*	*1,760 h*	*0 h*	*0 h*	*0 h*	*1,760 h*
48	*MandS*	*72,000*	*$72,000.00*	*$0.00*	*$0.00*	*$72,000.00*	*72,000*		*0*	*0*	*72,000*
77	*Dan Edmunds*	*100%*	*$0.00*	*$0.00*	*$0.00*	*$0.00*	*880 h*	*0 h*	*0 h*	*0 h*	*880 h*
78	*Phillipe Laurens*	*100%*	*$0.00*	*$0.00*	*$0.00*	*$0.00*	*880 h*	*0 h*	*0 h*	*0 h*	*880 h*

Notes
WBS Definition-
This task provides for the support of two university engineers (D. Edmunds, Phillipe Laurens) full time for oversight, consultation and testing/monitoring tasks during trigger installation effort.

M&S BOE-
Sufficient M&S for the support of the University engineers for the duration of the project, starting when L1Cal Trig fabrication is completed.

Labor BOE-
NA

1.5.8.6.2.3	Complete System Integration Tests on Sidewalk - UIC & CU	Fri 7/15/05	Thu 8/11/05	$0.00	$0.00	$0.00	$0.00

ID	*Resource Name*	*Units*	*Cost*	*Baseline Cost*	*Act. Cost*	*Rem. Cost*	*Work*	*Ovt. Work*	*Baseline Work*	*Act. Work*	*Rem. Work*
12	*PhysicistU*	*200%*	*$0.00*	*$0.00*	*$0.00*	*$0.00*	*320 h*	*0 h*	*0 h*	*0 h*	*320 h*

Notes
WBS Definition-
This task completes the integration tests on the sidewalk of the completed L1Cal Trigger system. It extends from the installation of the last ADF up to the beginning of the shutdown.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost

"Complete System Integration Tests on Sidewalk - UIC & CU" continued

Notes

M&S BOE-
NA

Labor BOE-
Estimated by people who built existing cal L1. Two shifs per day assumed.

1.5.8.6.2.4 Complete System Integration Tests on Sidewalk - FNAL | Fri 7/15/05 | Thu 8/11/05 | $0.00 | $0.00 | $0.00 | $0.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	200%	$0.00	$0.00	$0.00	$0.00	320 h	0 h	0 h	0 h	320 h

Notes

WBS Definition-
This task completes the integration tests on the sidewalk of the completed L1Cal Trigger system. It extends from the installation of the last ADF up to the beginning of the shutdown.

M&S BOE-
NA

Labor BOE-
Estimated by people who built existing cal L1. Two shifs per day assumed.

1.5.8.6.2.5 Decable BLS cables from Trigger Crates | Mon 10/3/05 | Fri 10/7/05 | $0.00 | $0.00 | $2,092.00 | $2,092.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	100%	$0.00	$0.00	$0.00	$0.00	40 h	0 h	0 h	0 h	40 h
12	PhysicistU	400%	$0.00	$0.00	$0.00	$0.00	160 h	0 h	0 h	0 h	160 h
37	SeniorElecEngF	50%	$943.00	$0.00	$0.00	$943.00	20 h	0 h	0 h	0 h	20 h
40	SeniorMechTechF	100%	$1,149.00	$0.00	$0.00	$1,149.00	40 h	0 h	0 h	0 h	40 h
55	Linda Bagby	100%	$0.00	$0.00	$0.00	$0.00	40 h	0 h	0 h	0 h	40 h
72	John Anderson	50%	$0.00	$0.00	$0.00	$0.00	20 h	0 h	0 h	0 h	20 h
75	Alan Stone	100%	$0.00	$0.00	$0.00	$0.00	40 h	0 h	0 h	0 h	40 h

Notes

WBS Definition-
Decable present 1280 BLS cables from Cal Trig Racks: add new label to each cable, dress bundles aside in plastic cableway.

M&S BOE-
NA

Labor BOE-
Detailed estimate by A. Stone of labor involved: 1280 BLS cables in 10 racks means 128 cables per rack. Cables in rack come in 32 bundles (4 cables per bundle). Two persons would work as a team, will be able to do 2 racks per day (256 cables). Two teams can work in MCH1 at a time. Elapsed time: 2.5 days

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1.5.8.6.2.6 Depopulate and remove trigger crates | Mon 10/10/05 | Fri 10/21/05 | $0.00 | $0.00 | $6,482.00 | $6,482.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	100%	$0.00	$0.00	$0.00	$0.00	80 h	0 h	0 h	0 h	80 h
12	PhysicistU	400%	$0.00	$0.00	$0.00	$0.00	320 h	0 h	0 h	0 h	320 h
37	SeniorElecEngF	50%	$1,886.00	$0.00	$0.00	$1,886.00	40 h	0 h	0 h	0 h	40 h
40	SeniorMechTechF	200%	$4,596.00	$0.00	$0.00	$4,596.00	160 h	0 h	0 h	0 h	160 h
55	Linda Bagby	100%	$0.00	$0.00	$0.00	$0.00	80 h	0 h	0 h	0 h	80 h
72	John Anderson	50%	$0.00	$0.00	$0.00	$0.00	40 h	0 h	0 h	0 h	40 h
75	Alan Stone	100%	$0.00	$0.00	$0.00	$0.00	80 h	0 h	0 h	0 h	80 h

Notes

WBS Definition-
This task removes boards from trigger crates after BLS cables removed, then removes crates from racks. The crates need not be recovered for service after removal.
Power supplies and heat exchangers in the racks will also be removed during this task. Existing airflow ductwork at the top of the racks will likely not need to be removed.

M&S BOE-
NA

Labor BOE-
Detailed estimate by A. Stone. Two persons working as a team can depopulate and remove crates in 1 rack per day. Two teams can fit in MCH1. Elapsed time: 5 days.

1.5.8.6.2.7 Install Rack Infrastructure in active racks | Mon 10/17/05 | Fri 11/4/05 | $1,000.00 | $0.00 | $29,392.50 | $30,392.50

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
37	SeniorElecEngF	150%	$8,487.00	$0.00	$0.00	$8,487.00	180 h	0 h	0 h	0 h	180 h
39	SeniorMechEngF	125%	$7,117.50	$0.00	$0.00	$7,117.50	150 h	0 h	0 h	0 h	150 h
40	SeniorMechTechF	400%	$13,788.00	$0.00	$0.00	$13,788.00	480 h	0 h	0 h	0 h	480 h
48	MandS	1,000	$1,000.00	$0.00	$0.00	$1,000.00	1,000		0	0	1,000
69	John Fogelsong	50%	$0.00	$0.00	$0.00	$0.00	60 h	0 h	0 h	0 h	60 h
72	John Anderson	100%	$0.00	$0.00	$0.00	$0.00	120 h	0 h	0 h	0 h	120 h
76	Tom Regan	100%	$0.00	$0.00	$0.00	$0.00	120 h	0 h	0 h	0 h	120 h

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost

"Install Rack Infrastructure in active racks" continued

Notes

WBS Definition-
This involves outfitting 4 of the existing racks with water supply, heat exchangers, air blowers, 1553's, RMI's, smoke and drip detectors, Pulizzi boxes (all items taken from existing spares or new units).

M&S BOE-
Estimate $200 per rack additional small parts required.

Labor BOE-
Experience installing racks for Run1 forms the basis of estimate. Four persons can complete the four racks in one week.

1.5.8.6.2.8	Install Patch Panels in Passive Racks, reconnect BLS cables	Mon 11/7/05	Fri 11/11/05	$0.00	$0.00	$4,029.00	$4,029.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	50%	$0.00	$0.00	$0.00	$0.00	20 h	0 h	0 h	0 h	20 h
12	PhysicistU	200%	$0.00	$0.00	$0.00	$0.00	80 h	0 h	0 h	0 h	80 h
37	SeniorElecEngF	150%	$2,829.00	$0.00	$0.00	$2,829.00	60 h	0 h	0 h	0 h	60 h
38	SeniorElecTechF	100%	$1,200.00	$0.00	$0.00	$1,200.00	40 h	0 h	0 h	0 h	40 h
55	Linda Bagby	50%	$0.00	$0.00	$0.00	$0.00	20 h	0 h	0 h	0 h	20 h
69	John Fogelsong	100%	$0.00	$0.00	$0.00	$0.00	40 h	0 h	0 h	0 h	40 h
72	John Anderson	50%	$0.00	$0.00	$0.00	$0.00	20 h	0 h	0 h	0 h	20 h
75	Alan Stone	100%	$0.00	$0.00	$0.00	$0.00	40 h	0 h	0 h	0 h	40 h

Notes

WBS Definition-
Installs BLS patch panels in racks, reconnect BLS cables.

M&S BOE-
NA

Labor BOE-
Estimate by A. Stone based on mockup work on sidewalk: one person can do 1 rack per day (128 cables), 10 racks involved.

1.5.8.6.2.9	Install ADF, TAB/GAB, Readout, Controller Crates	Mon 11/7/05	Fri 11/18/05	$0.00	$0.00	$8,572.00	$8,572.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	100%	$0.00	$0.00	$0.00	$0.00	80 h	0 h	0 h	0 h	80 h
12	PhysicistU	100%	$0.00	$0.00	$0.00	$0.00	80 h	0 h	0 h	0 h	80 h
37	SeniorElecEngF	100%	$3,772.00	$0.00	$0.00	$3,772.00	80 h	0 h	0 h	0 h	80 h
38	SeniorElecTechF	200%	$4,800.00	$0.00	$0.00	$4,800.00	160 h	0 h	0 h	0 h	160 h
55	Linda Bagby	100%	$0.00	$0.00	$0.00	$0.00	80 h	0 h	0 h	0 h	80 h
69	John Fogelsong	50%	$0.00	$0.00	$0.00	$0.00	40 h	0 h	0 h	0 h	40 h
72	John Anderson	50%	$0.00	$0.00	$0.00	$0.00	40 h	0 h	0 h	0 h	40 h
75	Alan Stone	100%	$0.00	$0.00	$0.00	$0.00	80 h	0 h	0 h	0 h	80 h

Notes

WBS Definition-
Remove four TT crates from sidewalk racks, transport to MCH1, install in MCH1 racks. Ditto for TAB/GAB, readout, and controller crates.

M&S BOE-
NA

Labor BOE-
A. Stone estimate: two physicists will do 2 crates per day.

1.5.8.6.2.10	Connect Pleated Foil Cables	Mon 11/14/05	Fri 11/18/05	$0.00	$0.00	$1,886.00	$1,886.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	50%	$0.00	$0.00	$0.00	$0.00	20 h	0 h	0 h	0 h	20 h
12	PhysicistU	200%	$0.00	$0.00	$0.00	$0.00	80 h	0 h	0 h	0 h	80 h
37	SeniorElecEngF	100%	$1,886.00	$0.00	$0.00	$1,886.00	40 h	0 h	0 h	0 h	40 h
55	Linda Bagby	50%	$0.00	$0.00	$0.00	$0.00	20 h	0 h	0 h	0 h	20 h
75	Alan Stone	100%	$0.00	$0.00	$0.00	$0.00	40 h	0 h	0 h	0 h	40 h
85	Johnny Green	100%	$0.00	$0.00	$0.00	$0.00	40 h	0 h	0 h	0 h	40 h

Notes

WBS Definition-
Connect pleated foil cables (40 per TT crate) from BLS patch panels.

M&S BOE-
NA

Labor BOE-
Taken from cabling of the L2muon trigger system; one person can do 20 per day.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.8.6.2.11	Connect ADF -- TAB/GAB and TFW cables	Mon 11/21/05	Tue 11/22/05	$0.00	$0.00	$0.00	$0.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	100%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
12	PhysicistU	200%	$0.00	$0.00	$0.00	$0.00	32 h	0 h	0 h	0 h	32 h
55	Linda Bagby	100%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h
75	Alan Stone	100%	$0.00	$0.00	$0.00	$0.00	16 h	0 h	0 h	0 h	16 h

Notes

WBS Definition-
Connect the 61 cables per ADF (3x20 LVDS + 1), controller and readout cables.

M&S BOE-
NA

Labor BOE-
Estimate 1 person can cable one ADF crate per day.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.8.6.2.12	L1 Cal Ready for Technical Commissioning	Tue 11/22/05	Tue 11/22/05	$0.00	$0.00	$0.00	$0.00

Notes

WBS Definition-
Milestone- All L1 Cal components are installed in MCH1.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.8.6.2.13	Technical commissioning in MCH1-UIC & CU	Wed 11/23/05	Wed 1/4/06	$0.00	$0.00	$0.00	$0.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
12	PhysicistU	300%	$0.00	$0.00	$0.00	$0.00	600 h	0 h	0 h	0 h	600 h
96	Sabaine Lammers	100%	$0.00	$0.00	$0.00	$0.00	200 h	0 h	0 h	0 h	200 h

Notes

WBS Definition-
Operate full system in MCH1, verify cabling, check L1, L2, L3 data, calibrate the Trigger Towers, compare TT and precision readout, develop final ADF coefficients, study debug triggers. Because all racks have been operated in the DAB1 test area, possible malfunction due to the relocation to the MCH1 einvironment is not likely. Tevatron collisions assumed for at least part of period, but operation with cosmics, pulsers also likely.

M&S BOE-
NA

Labor BOE-
Estimated by people who built existing cal L1. As university/FNAL division of labor becomes defined, specific personnel and Universities will be identified.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.8.6.2.14	Technical commissioning in MCH1-FNAL	Wed 11/23/05	Wed 1/4/06	$0.00	$0.00	$0.00	$0.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
11	PhysicistF	300%	$0.00	$0.00	$0.00	$0.00	600 h	0 h	0 h	0 h	600 h
55	Linda Bagby	100%	$0.00	$0.00	$0.00	$0.00	200 h	0 h	0 h	0 h	200 h

Notes

WBS Definition-
Operate full system in MCH1, verify cabling, check L1, L2, L3 data, calibrate the Trigger Towers, compare TT and precision readout, develop final ADF coefficients, study debug triggers. Because all racks have been operated in the DAB1 test area, possible malfunction due to the relocation to the MCH1 einvironment is not likely. Tevatron collisions assumed for at least part of period, but operation with cosmics, pulsers also likely.

M&S BOE-
NA

Labor BOE-
Estimated by people who built existing cal L1. As university/FNAL division of labor becomes defined, specific personnel and Universities will be identified.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.8.7	Level 1 Cal Trigger Installed & Technical Commissioning (	Tue 1/17/06	Tue 1/17/06	$0.00	$0.00	$0.00	$0.00

Notes

WBS Definition-
Milestone-The level 1 calorimeter trigger has been installed and technically commissioned, so that it is ready for beam in the detector.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.8.8	Level 1 Calorimeter Track Matching	Fri 1/7/05	Thu 1/19/06	$2,000.00	$0.00	$11,486.00	$13,486.00

Notes

WBS Definition-
This summary element provides for improvements in the Run2a track-matching trigger. It includes development and procurement of slightly modified versions of existing Level 1 muon cards, and procurement of related cabling, connectors, readout crates, processors, and power supplies.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.8.8.1	L1 Cal/Track Match Production and Testing Completed	Wed 6/1/05	Wed 6/1/05	$0.00	$0.00	$0.00	$0.00

Notes

WBS Definition-
Milestone-All production and testing for the cal/track match has been done.

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
1.5.8.8.2	L1 Cal/Trk Match Installation	Tue 6/21/05	Tue 7/19/05	$0.00	$0.00	$0.00	$0.00

Notes

WBS Definition-

WBS	Name	Start	Finish	M&S EQ	M&S Labor	FNAL Labor	Total Cost
"L1 Cal/Trk Match Installation" continued							

Notes
This summary task describes the installation of the complete cal-track matching system in the experiment.

1.5.8.8.2.1	Install Production L1 CTM electronics in MCH	Tue 6/21/05	Tue 7/19/05	$0.00	$0.00	$0.00	$0.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
12	PhysicistU	100%	$0.00	$0.00	$0.00	$0.00	160 h	0 h	0 h	0 h	160 h

Notes
WBS Definition-
Install MTCxx, MTFB, and MTCM in crate and connect cables (need ~30 cables from L1Cal trig and L1Cal trk) and do final cable dressing. Work to be completed prior to RunIIb shutdown.

Labor BOE-
Experience installing Level 1 muon trigger cards in Run 2a. Assumes two physicists at 50% FTE each.

1.5.8.8.3	**L1 Cal/Track Match Installed in MCH**	**Tue 7/19/05**	**Tue 7/19/05**	**$0.00**	**$0.00**	**$0.00**	**$0.00**

Notes
WBS Definition-
Milestone-MCH portion of CTM installed.

1.5.8.8.4	**L1 Cal/Trk Match Preliminary Technical Commissioning**	**Fri 1/7/05**	**Thu 1/19/06**	**$2,000.00**	**$0.00**	**$11,486.00**	**$13,486.00**

Notes
WBS Definition-
This summary task describes the technical commissioning of the cal-track matching system in the experiment. It begins shortly after the run resumes using muon trigger cards after the 2004 shutdown, and continues until production L1Caltrk cards are available.

1.5.8.8.4.1	Debug timing and trigger signals from the TFW	Fri 1/7/05	Fri 1/21/05	$0.00	$0.00	$0.00	$0.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
12	PhysicistU	200%	$0.00	$0.00	$0.00	$0.00	160 h	0 h	0 h	160 h	0 h

Notes
WBS definition -
Verify that the cal-trk trigger is receiving proper timing (BOT) and trigger signals from the trigger framework. Production crate managers will be on hand early 2005.

M&S BOE -
No M&S associated with this task

Labor BOE -
Requires full electronics chain (trigger framework, serial command link hub, muon fanout card, muon readout card) to be available. In run 2a, this took approximately 4 months, but much more of the infrastructure will be in place and tested at the time of the Run IIb task: 1 month of physicist time.

1.5.8.8.4.2	Establish L2, L3 readout	Mon 1/24/05	Fri 2/18/05	$0.00	$0.00	$0.00	$0.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
12	PhysicistU	100%	$0.00	$0.00	$0.00	$0.00	160 h	0 h	0 h	0 h	160 h

Notes
WBS Definition-
Record data sent to L2 and L3 and verify format.
done before shutdown!

M&S BOE-
NA

Labor BOE-
RunIIa experience establishing readout of L2 and L3 data from Level 1 muon trigger: 1 physicist full time for a month.

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1.5.8.8.4.3	Make L1 latency change	Mon 10/3/05	Wed 10/5/05	$2,000.00	$0.00	$0.00	$2,000.00

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
44	SeniorElecEngU	100%	$0.00	$0.00	$0.00	$0.00	20 h	0 h	0 h	0 h	20 h
48	MandS	2,000	$2,000.00	$0.00	$0.00	$2,000.00	2,000		0	0	2,000
77	Dan Edmunds	100%	$0.00	$0.00	$0.00	$0.00	20 h	0 h	0 h	0 h	20 h

Notes
WBS Definition-
Install L1 total latency change in TFW

M&S BOE-